THE BLUEJACKETS' MANUAL

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UNITED STATES NAVY

1940

TENTH EDITION

UNITED STATES NAVAL INSTITUTE
ANNAPOLIS, MARYLAND
1940

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THE SECRETARY OF THE NAVY
WASHINGTON, D.C.

THE *Bluejackets' Manual,* originally prepared in 1902 by Lieutenant Ridley McLean, United States Navy, and revised in 1914, 1916, 1922, and 1927, has been revised again by the United States Naval Institute as authorized and approved by the Bureau of Navigation. The training courses of the Bureau of Navigation have furnished a medium for issuing information of a specialized or technical character to the service. The purpose of this revision has been to modernize the manual so that it agrees in substance with the latest training courses and includes such other information as would tend to make an able seaman and a thorough man-o'-war's man.

The *Manual* is divided in the following parts:

Part I. For the recruit.

Part II. (A to N) The subjects which every man on board ship should know.

Part III. Rudimentary seamanship and gunnery.

Part IV. Advanced seamanship and gunnery.

Part V. Physical drills.

Part VI. Landing force.

Part VII. Miscellaneous.

The chapters in the *Bluejackets' Manual* which give the details of the manual of arms, infantry, artillery, extended order, and landing force are sections of the revised *Landing Force Manual* which have not yet been printed.

WILLIAM D. LEAHY
Acting

March, 1938

FOREWORD TO NINTH EDITION (REVISED)

This revised edition is necessary because of the changes in the landing force regulations; otherwise, except for a few minor corrections, it is the same as the eighth edition published in 1938.

G. V. STEWART
Captain, U. S. Navy
Secretary-Treasurer
U. S. Naval Institute

ANNAPOLIS, MARYLAND
April, 1939

FOREWORD TO TENTH EDITION

This tenth edition has become necessary by the Navy's adoption of the U. S. Army's drill regulations and the desirability of new type setting for clearness of print. As compared with the ninth edition (revised) the following changes should be noted:

Chapters 7, 8, and 9 now accord with the close order drill of the U. S. Army.

Chapter 41, "Artillery: School of the Platoon," has been replaced by "Cart Drill."

Chapter 51, "Artillery: 75-mm. Pack Howitzer," has been omitted because that weapon will no longer be carried aboard ship.

G. V. STEWART
Captain, U. S. Navy
Secretary-Treasurer
U. S. Naval Institute

ANNAPOLIS, MARYLAND
June, 1940

NATIONAL ANTHEM

THE STAR-SPANGLED BANNER

Oh, say, can you see, by the dawn's early light,
What so proudly we hailed at the twilight's last gleaming?
Whose broad stripes and bright stars, thro' the perilous fight,
O'er the ramparts we watched, were so gallantly streaming.
And the rockets' red glare, the bombs bursting in air,
Gave proof through the night that our flag was still there.
Oh, say, does that star-spangled banner yet wave
O'er the land of the free and the home of the brave?

On the shore dimly seen, thro' the mists of the deep,
Where the foe's haughty host in dread silence reposes,
What is that which the breeze, o'er the towering steep,
As it fitfully blows, half conceals, half discloses?
Now it catches the gleam of the morning's first beam,
In full glory reflected, now shines on the stream;
'Tis the star-spangled banner; oh, long may it wave
O'er the land of the free and the home of the brave.

Oh, thus be it ever when freemen shall stand
Between their loved home and the war's desolation;
Blest with vict'ry and peace, may the heav'n-rescued land
Praise the Power that has made and preserved us a nation.
Then conquer we must, when our cause it is just,
And this be our motto: "In God is our trust";
And the star-spangled banner in triumph shall wave
O'er the land of the free and the home of the brave.

CONTENTS

Flags of Principal Maritime Nations ..... Plates I and II

Distinctive Flags and Pennants ..... Plate III

Flag and Dot-and-Dash Alphabet ..... Plate IV

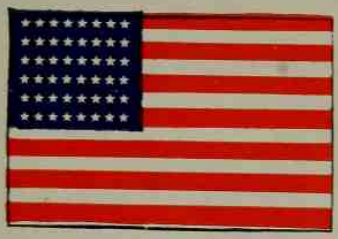
Numeral Flags and Pennants ..... Plate V

Special Flags and Pennants ..... Plates VI and VII

PLATE I.

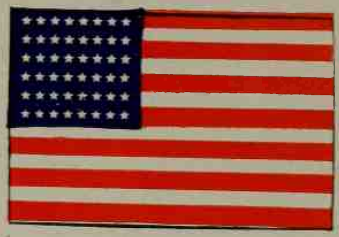
FLAGS OF PRINCIPAL MARITIME NATIONS

UNITED STATES



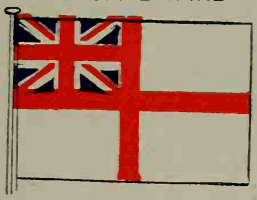
MAN-OF-WAR

UNITED STATES



MERCHANT

BRITISH EMPIRE



MAN-OF-WAR

BRITISH EMPIRE

MERCHANT

GERMANY

MAN-OF-WAR

GERMANY

MERCHANT

Iron Cross is not present unless ship is a naval reserve vessel.

JAPAN

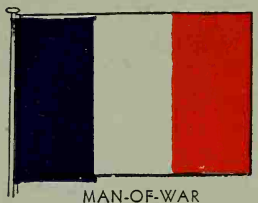
MAN-OF-WAR

JAPAN

MERCHANT

FLAGS OF PRINCIPAL MARITIME NATIONS

FRANCE



MAN-OF-WAR
NATIONAL and
MERCHANT

NETHERLANDS

MAN-OF-WAR
NATIONAL and
MERCHANT

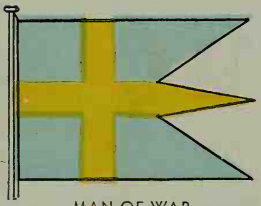
ITALY

MAN-OF-WAR

ITALY

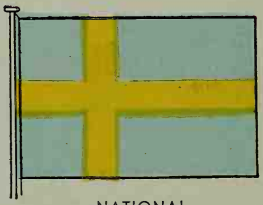
MERCHANT

SWEDEN



MAN-OF-WAR

SWEDEN

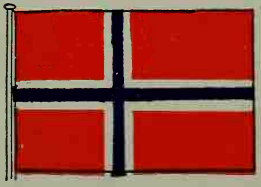


NATIONAL
MERCHANT

NORWAY

MAN-OF-WAR

NORWAY



MERCHANT

PLATE III.

DISTINCTIVE FLAGS AND PENNANTS

SECRETARY OF THE NAVY*

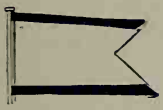
Commission Pennant U.S. Navy 7 Stars

ADMIRAL

VICE ADMIRAL

REAR ADMIRAL

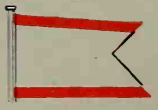
COMMODORE



BROAD COMMAND Pennant

BURGEE COMMAND Pennant

SENIOR OFFICER Present

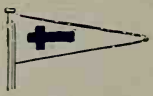


NAVAL DISTRICT Force Commander

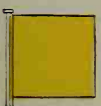
NAVAL DISTRICT Section Commander

NAVAL DISTRICT Division Commander

BATTALION INFANTRY



CHURCH



QUARANTINE

RED CROSS

BATTALION ARTILLERY

MERCHANT MARINE NAVAL RESERVE FLAG

NAVAL RESERVE YACHT PENNANT

NAVAL MILITIA Commission Pennant

NAVAL MILITIA Distinguishing

CONSULAR FLAG

*Flag Under Sec. Navy similar with red field and white stars and anchor.
*Flag Asst. Sec. Navy similar with white field and blue stars and anchor.

FLAG AND DOT AND DASH ALPHABET

Afirm •—	Jig •———	Sail •••
Baker —•••	King —•—	Tare —
Cast —•—•	Love •—••	Unit ••—
Dog —••	Mike ——	Victor •••—
Easy •	Negat —•	William •——
Fox ••—•	Option ———	Xray —••—
George ——•	Prep •——•	Yoke —•——
Hypo ••••	Queen ——•—	Zed ——••
Int ••	Roger •—•	

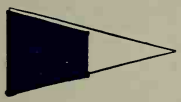
NUMERAL FLAGS AND PENNANTS

FLAGS	PENNANTS	NAME SPOKEN	WRITTEN	FLASHING LIGHT EQUIVALENT Not Used in Text of Signals	How Transmitted in Text of Signals
		One	1	·————	One
		Two	2	··———	Two
		Three	3	···——	Three
		Four	4	····—	Four
		Five	5	·····	Five
		Six	6	—····	Six
		Seven	7	——···	Seven
		Eight	8	———··	Eight
		Nine	9	————·	Nine
		Zero	Ø	—————	Zero

SPECIAL FLAGS AND PENNANTS

FLAGS	NAME SPOKEN	WRITTEN	TRANSMITTED
	Squad	Squad	Squad
	Div	Div	Div
	Sect	Sect	Sect
PENNANTS			
	Emerg	Emerg	Emerg
	Desig	Desig	Desig
	Corpen	Corpen	Corpen
	Turn	Turn	Turn
	Deploy	Deploy	Deploy
	Formation	Form	Form
	Posit	Posit	Posit

PLATE VII.

PENNANT	NAME SPOKEN	WRITTEN	TRANSMITTED
	Speed	Speed	Speed
	First Repeat	Alphabet letter or numeral it represents	None
	Second Repeat		None
	Third Repeat		None
	Fourth Repeat		None
	Answering and Fourth Decimal Pennant	Ans	As answering pennant, none. As decimal or half pennant, Ans
	S. O. P. Pennant also Fleet Guide	Sopus	Sopus
A piece of line 6 feet long fitted with a snap and ring like a flag.	Tack Line	Tack	Tack

CONTENTS

PART 1.—FOR THE RECRUIT

CHAPTER 1.—The Navy as a Career 3
Your naval career; Leader of men; General education; You enter the naval training station; Receiving unit; Pertinent advice.

CHAPTER 2.—Clothing 9
Drawing clothing; Regulations for marking clothing; Prescribed outfit; Regulation clothing; Special advice about clothing; Folding clothes; Stowing clothes; Bag inspection; Stopping clothes on line.

CHAPTER 3.—General Information 16
Hammocks; Cleanliness; Field day; Inspection; Medical service; Ship's service; Important points; Government insurance; Library; Deposits of money for safekeeping or saving; Friends; Gambling; Profanity; Moral turpitude; Athletics and recreation; Mast for requests; Captain's mast; Seeing the captain and executive officer; Officers at training station; Officers aboard ship.

CHAPTER 4.—Rules and Regulations 27
Rules of discipline; Respect for authority; Good behavior; The twofold nature of duty in the Navy; Refusal to obey; Result of misconduct; Neglect of duty; Deliberate violation of orders or regulations; Punishments in the Navy.

CHAPTER 5.—Rules and Regulations—*Continued* 33
Unauthorized absence; Desertion; Fraudulent enlistment; Fines; Summary; Theft; Articles for the government of the Navy; Redress of wrongs; Fighting and disturbances; Rules regarding salutes.

CHAPTER 6.—School of the Recruit 41
Position of attention; Salute with the hand; The rests; Eyes right or left; Facings; Steps and marching; To face in marching; To change step.

CHAPTER 7.—Manual of Arms 48

CHAPTER 8.—School of the Squad 59

CHAPTER 9.—School of the Platoon 65

CHAPTER 10.—Boats under Oars 74
Tables of commands; Explanation of commands.

CHAPTER 11.—To pull an Oar: Nomenclature 85
Positions; Nomenclature; Notes on handling boats under oars.

CHAPTER 12.—Knots and Splices 94
Knots; Long and short splices.

CHAPTER 13.—The Compass 99
Description; Relative bearings.

CHAPTER 14.—Visual Signaling 103
Semaphore; Semaphore alphabet; Procedure signs; Calls.

CHAPTER 15.—How to Swim 107
The requirements; The strokes; Treading water; Conclusion.

CHAPTER 16.—What the Navy Offers 119
Service schools; General requirements for entry to service schools; Appointment of enlisted men to Naval Academy; Promotion to warrant rank; Promotion to commissioned rank; Pay grades; The future the Navy has to offer; Conclusion.

CHAPTER 17.—Reporting for Duty aboard Ship 125
General instructions.

PART 2.—SUBJECTS ALL ENLISTED MEN SHOULD KNOW—A TO N

CHAPTER 18.—A—Discipline and Duty 131
Twofold nature of duty in the Navy; The importance of accurate knowledge; Discipline; The nature of an order and of a command; Security of information.

CHAPTER 19.—B—What the Service Offers 135
General; Liberty; Leave; Shore duty; Re-enlistments; Permanent appointments for chief petty officers; The ship as a training school; Advancement in rating; Appointments to petty officer ratings; Retirement; Medals and rewards; Citizenship; Examining boards and examinations.

CHAPTER 20.—C—Enlistments, Discharges, Courts-martial 146
First enlistments; Extension of enlistments; Re-enlistments; Discharges; Proficiency in rating and conduct; Advantage of honorable discharge; Transportation after discharge; Service records; Overstaying liberty; Desertion; Naval courts-martial; Punishments by the commanding officer.

CHAPTER 21.—D—Pay and Accounts 159
Pay grades; Extra allowances; Accounts: Payments of money; Loss of pay due to breaking liberty; Example of chief petty officers' pay; Time not served and time lost due to misconduct; General information on stores titles; Ships' allotments.

CHAPTER 22.—E—Navy Customs, Naval Organization 165
Rules regarding salutes; Rules for saluting officers; National anthem; National flag; Quarter-deck and gangways; The Navy and its relation to the government; The President; The Secretary of the Navy; Bureaus and offices; The commander in chief of a fleet; Rank; Corps devices; Exercise of authority.

CHAPTER 23.—F—General Characteristics of Ships 175
General; Hull; Armor; Drainage system; Ventilation system; Watertightness; Nomenclature of decks; Bulkheads; Peak tanks; Questions and answers.

CHAPTER 24.—G—General Features of Ships of the Navy 188
Type classification; Features of different types of ships.

CHAPTER 25.—H—Events in the Daily Routine 201
Daily routine in port; Daily routine at sea; Notes on routine; Messes; Watches and divisions; Scrubbing and cleaning; Smoking hours; Lucky bag; Ship's orders; Miscellaneous information.

CHAPTER 26.—I—Aim and Object of All General Drills 215
General; Water-tight integrity; Details of drills; Fire drill; Collision drill; Abandon ship drill; Fire and rescue drill; Plane crash and salvage; Battle drill; Battle bill; General quarters; Fueling ship.

CHAPTER 27.—J—Regulations in Regard to Uniform and Clothing 235
Regulations for marking clothing; Prescribed outfit; Uniform of the day; Side arms, leggings, etc.; Pins and jewelry; The hair and beard; Geneva-cross and shore patrol brassards; Custody of clothing, arms, and accouterments; Regulation clothing; Rain clothing; Laws affecting the uniform; Neckerchiefs; Care of clothes; Requisitions for clothing; Fresh water.

CHAPTER 28.—K—Personal Hygiene and First Aid 245
Personal hygiene; Elementary first aid; Wounds in general; Hemorrhage or bleeding; Application of first-aid dressings; Sprains, dislocations, and fractures; Methods of carrying the wounded; Use of regular and improvised stretchers; Other injuries.

CHAPTER 29.—L—Painting and the Preparation of Surfaces Therefor ... 286
Paints in general; Application of paint; Bottom paints; Brushes and how to care for them; Preparation of surfaces to be painted; A few don'ts; Poisonous effect produced by paints.

CHAPTER 30.—M—Swimming; Life Saving; Life Buoys 295
Life-saving methods; Artificial respiration; Life buoys.

CHAPTER 31.—N—Athletics 307
Athletics on board ship.

PART 3.—RUDIMENTARY SEAMANSHIP AND GUNNERY

CHAPTER 32.—Boats 313
Classes and types; Terms used with boats; Boat gear carried; Boat chest; Medical emergency box; Cooking utensils; Provisions; Fire-fighting equipment; Stowage of boats; Boat salutes; Duties of a boat keeper, salutes required; Lifeboats.

CHAPTER 33.—Sails and Sailing 339
Boat sails; Rigs of sailing ships; Rig of sail boats; Rigging; Definitions; Principles of sailing; Bending and sheeting sails; Trim; Tacking; Wearing; General precautionary notes; Rules of the road; Preparations prior to sailing; Boats under sail (drills); Sailing races, general rules.

CHAPTER 34.—Marlinespike Seamanship 381
General; Rope; Fiber rope; Uncoiling Manila rope; Small cordage; Size of fiber rope; Care of fiber rope; Care of fiber rigging; Knotting; Miscellaneous methods of securing; Splicing; Seizing; Worming, parceling, and serving; Palm and needle; Sennit; Turk's-head; Coxcombing; Pointing ropes and hawsers; Power-boat trimmings.

CHAPTER 35.—Duties of Seaman Watches, Under Way and at Anchor ... 405
Masthead and deck lookouts; Life-buoy lookouts; Special lookouts; Engine-order telegraph; Breakdown and man-overboard signal watch; Speed-cone watch; Night-speed-indicator watch; Flag-speed-indicator watch; Fog-whistle and fog-bell watch; Fog-buoy or towing-spar watch; Duties of the various messengers; General duties of a sentry; General duties of an orderly; Side boys; Sweepers; Side cleaners; Jack-o'-the-dust; Anchor watch; The watch at sea.

CHAPTER 36.—Deck Seamanship 424
Sea terms; Preparing for port; Getting under way; Rigging gangways and booms; Heaving a line; Mooring a ship with lines; Mooring to a buoy; Fenders; Boat lines and their uses; Coiling down rope; Forward hold; Tarring down; Awnings.

CHAPTER 37.—Ground Tackle 442
Definition; Types of anchors; Anchors carried on ships; Anchors—General; Anchor cables; Shackles; Swivels; Cable markings; Billboard stowage of anchors; Foul anchors; Care of ground tackle; Mooring with anchors.

CHAPTER 38.—Steering and Sounding 457
The rudder; Types of steering gear; Steering orders; Instructions for good steering; Compasses; Logs; Sounding.

CHAPTER 39.—Electricity 474
Nature of electricity; Electrical apparatus.

CHAPTER 40.—Carrying the Automatic Rifle and Submachine Gun 482
Rules governing carrying of the automatic rifle; Rules governing carrying of the submachine gun.

CHAPTER 41.—Cart Drill 485

CHAPTER 42.—Small Arms 490
The United States magazine rifle, model of 1903; The pistol; The object of sighting, position, and aiming drills and of gallery practice, general principles of individual range firing; Safety precautions.

CHAPTER 43.—Elementary Gunnery 511
Gunnery training; Guns; Primers; Fuzes; Powder; Projectiles; Summary; Magazines and shell rooms; Safety precautions for all hands.

CHAPTER 44.—Navy Signal Systems 531

PART 4.—ADVANCED SEAMANSHIP AND GUNNERY

CHAPTER 45.—Advanced Seamanship and Gunnery 539
Power boats; Aviation seamanship; Abbreviated rules for boat coxswains; Safety precautions—Gasoline-driven power boats; Other boats—Handling and uses; Rules of the road; Tides; Buoys; Storm warning signals.

CHAPTER 46.—A Section, a Watch at Sea, C. & R. Soundings 588

CHAPTER 47.—Marlinespike Seamanship 597
Wire rope.

CHAPTER 48.—Deck Seamanship 617

CHAPTER 49.—Instructing, Messes, Precedence 631
CHAPTER 50.—Ground Tackle 636
Handling anchors and chain; Mooring ship.
CHAPTER 51.—Small Arms; Details of Individual and Collective Firing .. 646
CHAPTER 52.—Signals, Boat and Ship 651

PART 5.—PHYSICAL DRILLS

CHAPTER 53.—Physical Drills without Arms 663
General; Starting positions of the arms; Starting positions of the legs; Starting positions of the trunk; Miscellaneous starting positions; Combined starting positions of the arms and legs; Leg exercises carried out from the starting positions; Arm exercises carried out from the starting positions; Neck exercises carried out from the starting positions; Trunk exercises carried out from the starting positions.
CHAPTER 54.—Physical Drills with Arms 681

PART 6.—LANDING FORCE

CHAPTER 55.—Equipment Carried by Each Man: Haversack, Pack, Rations; Assembling the Equipment 691
Landing force; Light marching order; Heavy marching order; The infantry pack.
CHAPTER 56.—Extended Order 706
Exercises; Combat principles of the rifle squad and platoon; Combat signals.

PART 7.—MISCELLANEOUS

CHAPTER 57.—Miscellaneous 731
Submarine service; Naval Reserve; Navy training courses; Duties of a petty officer; Disposition of effects of deserters, deceased men and men going on leave.
CHAPTER 58.—Gas-Protective Apparatus 744
War-time gas attack; Gas-mask drills; Upkeep of gas masks; Gases encountered in peace-time operations; Asphyxia; Artificial respiration; Protective apparatus; Gas masks for submarines.
CHAPTER 59.—The Use of Boatswain's Call 773
History; Piping and passing the word.

PART ONE
FOR THE RECRUIT

CHAPTER 1

THE NAVY AS A CAREER

Your naval career 3
Leader of men 3
General education 5
You enter the naval training station 6
Receiving unit 7
Pertinent advice 8

YOUR NAVAL CAREER

YOU ARE now beginning your naval career. You enlisted for various reasons, such as to learn a trade, to see the world, to go to sea, to improve your station in life, etc. You are young and your future is before you. Many of you have not thought seriously of your future, and probably few of you have made up your minds as to what you would really like to do. You will now have 12 weeks of training, and at the end of that time you will be sent to various ships for service in our Navy. Upon arrival aboard ship, some of you will be sent to the engineer's department for duty as firemen and will be gradually developed into machinist's mates, water tenders, metalsmiths, electrician's mates, etc. The rest of you will remain in the seaman branch and gradually develop into coxswains, boatswain's mates, gunner's mates, carpenter's mates, shipfitters, quartermasters, etc. The training that starts here at the training station will be continued on board ship. In every case this training is for the sole purpose of making you a useful man, a trained man, and a leader of men.

Keep this always in mind: You are being trained to be a future leader of men. The hardest workers among you may become chief petty officers, warrant officers, and commissioned officers. The rest of you will only get as far as your work, study, and efforts entitle you to go.

LEADER OF MEN

Once in a great while a man is born a leader. The rest of us become leaders by hard study and long practice of the rules of leadership handed down to us by the great leaders of the past. Following are given the rules laid down by these leaders. Study them and practice them, for your future

success will depend upon your ability to master them, whether in the naval service or later in civilian life.

Each man who desires to be a leader of men must learn the following essential points:

Obedience does not mean blindly carrying out an order or grudgingly doing what you are ordered or directed to do and then only doing enough to get by. Obedience means first of all cheerful and willing obedience and, secondly, intelligent obedience.

Good behavior and a clean record are necessary for promotion to positions of leadership. Men sometimes fail of promotion to warrant and commissioned rank because of bad records during early enlistments.

Knowledge comes only through study and hard work. There is no royal road to learning." Men always respect you for what you know. It pays to know, and to know you know. Know your own job. Know the job ahead of yours.

Fighting spirit.—You know what this is. Without it, you are only a human biped who wears pants. With it, you are a live, red-blooded go-getter—one who will succeed. Have you the grit to *stay with* a hard job? Never say "I can't." Forget there is such a phrase. Don't be a quitter. "A man may be down but never out"—until he admits it.

Reliability.—Always do what you are told to do, and do it the best you know how. Can you be depended upon, whether alone on a job or with others? Get the reputation of seeing the job through.

Loyalty.—Stick up for yourself, your officers, your petty officers, your company, your ship. As you show loyalty to them, they will show loyalty to you, and people under you will do the same. Boost. If you cannot boost, do not knock.

Initiative.—This is one of the outstanding qualifications of a leader. The man with initiative takes hold of the things that need doing and does them without being told, while the other fellow is standing idly by because no one has told him what to do. A man with initiative thinks on his feet. He can be trusted to take care of an unexpected situation because he is always on the alert and thinking ahead of his job.

Self-control.—Do not fly off the handle. It nearly always gets you into trouble and always lessens the respect that others hold for you. If you lose your self-control in little things, you are sure to do so in big things. The man who cannot control himself will never develop into a real leader of others.

Energy.—A lazy man never has time to do anything right or to do anything to improve himself, and he never gets far. Be "peppy." Put

some drive into things. Carry a "self-starter." Don't have to be cranked every time to get started.

Courage.—A leader must have courage. He must have not only physical courage, he must have moral courage as well. He must be fearless in the face of his duty. A courageous man admits it when he is wrong and takes his medicine. He doesn't bluff. And when he is known as a man of courage he doesn't have to bluff.

Justice.—Be square. Play the game hard, but play it squarely. Give a square deal to others and expect one in return. Act so that others can respect you as a man.

Truthfulness.—The *final* test of a man is: In a pinch, will he lie? Lying is a dismissal offense at the United States Naval Academy, and is a punishable offense in the Navy. Many a man who told the whole truth has been let off or given light punishment, where the liar was punished for the offense and for lying as well.

Faith.—Believe in yourself. Trust yourself. Count on yourself. Count on yourself to be one of the best man-o'-war's men in the whole Navy, and then go to it and make good. Trust your fellowmen. They are good fellows and will meet you halfway as a rule. Believe in and trust the Navy. Splendid men have made it what it is. Do all you can to keep it as good as it is, and make it even better.

Honor.—Act so that your home folks will be proud of you, and will tell all of your friends what fine things you are doing in the Navy. Act so that others will want to be like you. Few men can survive dishonor. Remember you can never disgrace or dishonor yourself without bringing dishonor on your name, your people, and the uniform you wear.

Cheerfulness.—Smile and the world smiles with you. Smile when things go wrong. If you cannot smile, at least try to. You can surely keep the corners of your mouth *up*.

Honesty.—Enough said. Without honesty your career is limited and you are sure to fail in the long run. Nobody wants to deal with or associate with a cheat.

GENERAL EDUCATION

The Bureau of Navigation has prepared courses of training for many ratings. These courses show you what you must know to get that rating. Besides, there are many other courses that you can use to improve your general education. *Make use of them.* In addition to helping you to become a leader of men, a general education does the following:

(*a*) Increases your range of knowledge.

(*b*) Gives you a better command of yourself and of your personal ability.

(*c*) Trains your reasoning powers and enables you to think problems out better and more easily.

(*d*) Trains and stimulates your brain, and makes you more keenly alert and alive to world progress and affairs.

(*e*) Gives you pleasure in life by enabling you to enjoy the great works of science, art, etc.

(*f*) Gives you a wider viewpoint and opens up greater fields of opportunities.

(*g*) Gives you a better chance at success in life.

YOU ENTER THE NAVAL TRAINING STATION

Your first few days at the training station are probably days of great confusion to you. This little talk is to straighten out in your mind the process through which you have gone and to explain why.

You reported at the main gate and were taken then to the receiving unit. There you were fitted out with a uniform, took a bath, and were given a thorough medical examination. The examination was given to determine your state of health. You have to be physically sound before you can start your period of training. The dental officer examined your teeth, wrote down their condition, and, if anything was found wrong, you will be called in later to have this fixed.

You were told how to dispose of your civilian clothes. It is best by far to get rid of them entirely. Your uniforms are all you need, and the uniform is a suit of honor, which you can proudly wear anywhere. You cannot have civilian clothes either at the station or aboard ship. Some men keep civilian clothing in lockers ashore for liberty uses, but this is unnecessary and a source of large expense. Do not do it.

The chaplain or his yeoman has probably had a talk with you by this time and has asked you about your education, church preference, trade or profession, athletic ability, talent for entertainment, the rating you desire, your qualifications, your home, and the address of your parents or next of kin. This information is placed on your record and is used to assist in placing you properly aboard ship. The chaplain is always glad to help you in case of difficulty or trouble. Do not hesitate or be afraid to go to and talk with him freely.

You may be homesick and lonesome for a while. We all were. You are starting a new life, with new surroundings and new friends. Grin and bear it like we all did. No man ever succeeded by hanging on to his mother's apron strings all his life. But right here, do this: *Write home*

often and ask them to write to you often. A letter from home will buck you up more than anything else.

You are now getting your first taste of military training. It may seem hard to you at first because it is new, but it really is not as hard as it seems. Do what you are told to do, do it quickly and cheerfully, and you will be surprised how easy this military training becomes. Look at the chief petty officers who are taking care of you. Do they look downhearted, or look as though they have suffered from military training? Ask them questions about it. You will soon find that you will have more liberty, more privileges, and a happier existence under military training and discipline than you would have in similar positions in civil life.

You will be formed into a company of about 100 men and a chief petty officer will be put in charge of the company. This chief petty officer started his naval career just as you are now starting it. Through hard work and study he is now in a position of great trust and responsibility. He will teach you many useful things. Listen to him. Do what he tells you to do. Imitate his example. Ask him questions. Take your problems to him. He will be glad to help you, especially if you show him that you are really trying to help yourself.

You will soon be given the O'Rourke classification test. This test is given to discover the duties you can best perform. A high mark in this test will show that you will probably make a good petty officer. A low mark will show that you need a great deal of training and that you should study and work hard to make good. Do not be discouraged by a low mark, but dig in and make good.

RECEIVING UNIT

You remain three weeks in the receiving unit without liberty being granted. This is the hardest period of your naval career. This three weeks' detention is necessary to prevent the spread of any infectious diseases. In the training station you live close together. One man with an infectious disease could spread it to every man at the station. The doctors will examine you frequently. They much prefer keeping you well than curing you after you are sick. They know how to keep you from getting sick, and these three weeks of restriction is one of their methods of keeping sickness down to a minimum. Realize this and don't worry about it. Your liberty days will soon arrive, and you will find that you will have more liberties than you really want.

You will now be vaccinated against smallpox and given typhoid prophylaxis. This is another way our doctors have of preventing you from getting sick. Our Navy doctors seldom have a smallpox or typhoid

fever patient. These diseases kill lots of people in civil life every year. Our doctors just wipe out all our chances of getting these terrible diseases. We all know that these vaccinations are tough, for we have all had them, but we take them gladly because they prevent our catching these diseases.

As soon as your company is formed, you will begin your naval training. Some of the things you must learn before you can advance your rating will be told in the following chapters. Pay attention to your company commander. He will teach you many of these things, but this book will also help you, as you can study it at your leisure.

PERTINENT ADVICE

Everybody makes mistakes. This is human. That is why we have "erasers on our pencils." When you make mistakes do not try to bluff them through or make a lot of foolish excuses. Admit your mistakes frankly and take your medicine. But do not make the same mistake twice, and try not to make too many mistakes.

If you do not show respect to your officers or petty officers, you cannot expect them to show any respect for you.

Some men work without being told, some work when they are told, and some few only work when driven. The first class is easy to train, and from it will come our future leaders. The second class can be trained, and from it we get our followers. The last class cannot be trained, and in it are the ones whose discharge is to be hastened.

Yours is a profession, not a job. You do more than serve for pay alone. The government educates and trains you, and then gives you a fine position for life, for which, in turn, you agree to do whatever the government demands.

Always boost. If you cannot boost, at least do not knock. "Any fool can criticize. Most fools do."

Do not write letters to your Congressman or other people influential in political life, asking for special assignments to duty or for special favors. These people always send these letters to the Navy Department, and the fact that you have tried to get something by having a "political pull" rather than because you have merited or earned it will invariably cause your request to be turned down. If you want something special, write out your request to your commanding officer and turn it in to your executive officer. This is the proper Navy way of asking for things.

The efficiency of any ship depends upon the efficiency of the men aboard her. "Good men on poor ships are better than poor men on good ships."

CHAPTER 2

CLOTHING

Drawing clothing 9
Regulations for marking clothing 9
Prescribed outfit 11
Regulation clothing 11
Special advice about clothing 11
Folding clothes 12
Stowing clothes 13
Bag inspection 13
Stopping clothes on line 15

DRAWING CLOTHING

THE government furnishes without cost to each recruit a complete outfit of clothing. If you take proper care of this outfit it will last you for some time. You will be provided with a stencil for marking your clothes, and all your clothes should be marked according to *Navy Regulations*. These regulations will be given here, and you should learn them so that you can always keep your clothes marked correctly. These regulations show you how to mark your clothes so that none of the markings will show through and spoil the looks of your clothes. Besides this, these regulations assist the inspecting officer in inspecting your clothes, as he will know where to look for your name on each piece of clothing. You will save yourself a lot of trouble if you mark your clothes correctly at all times. If you do not do this, you will find yourself in trouble at every bag inspection. Learn now to do these things correctly.

REGULATIONS FOR MARKING CLOTHING

Every article of clothing shall be clearly marked with the owner's name, using black paint in marking white clothes and dungarees, and white paint on blue clothes, or with pen and indelible ink when labels are provided for the purpose. All markings will be made with a ¾-inch stencil cut by a stencil-cutting machine, except when garment labels are provided. The name will be legibly inscribed.

The markings will be located as follows:

Bathing trunks.—Inside on hem on right center of back.

Blankets.—All corners, 4 inches from each edge, both sides of blankets; total, 8 markings.

Cloth cap.—Inside sweat band.

Drawers.—On the outside of the right half waistband.

Gloves.—Initials on small white strip of cloth to be worn on inside of wrist.

Jerseys.—On strip of white cloth sewed on inside bottom front edge.

Jumpers, blue.—On a label under the collar at the back of the neck.

Jumpers, white.—On the inside on the hem to the right of the center line of the back; initials only inside back about 3 inches below the seam where collar is attached.

Jumpers, dungaree.—Same as white jumpers.

Leggings.—Inside on center seam, lengthwise.

Mattresses.—In center, 4 inches from each end, both sides of mattress; total, 4 markings.

Mattress covers.—Right corners, 4 inches from open end; total, 2 markings.

Neckerchief.—Diagonally across center.

Overcoat.—On a label on the inside breast pocket at the center (not inside the pocket).

Pillows.—Same as mattresses.

Pillow covers.—Right corners outside on hem; total, 2 markings.

Rubber boots.—On the inside near the top.

Rubber overshoes.—Initials on the inside near the top.

Shirts, chambray.—On the inside, near the bottom hem, to the right of the center line of the back; initials only inside back about 3 inches below the seam where collar is attached.

Shirts, flannel.—Same as shirts, chambray.

Shoes.—Inside near the top, or cut initials in side of heels.

Socks.—Initials on legs, across the top.

Towels.—Right corners on hem, paralled to end; total, 4 markings.

Trousers, blue.—On a label on the pocket at the right inside waistband.

Trousers, dungaree.—On the waistband on the inside in front, to the right of the center line.

Trousers, white.—On the waistband on the inside in front, to the right of the center line, and initials only on the under side of the pocket flap.

Undershirts.—On the outside of the front, 1 inch from the bottom of the shirt and to the right of the center.

Watch cap.—Initials inside on white strip of cloth ½ inch from bottom.

White hat.—On the outside of the brim of the hat when brim is turned down, sufficiently close to the crown that marking will not show when brim is turned up.

PRESCRIBED OUTFIT

The table showing the prescribed outfit will be found in Chapter 27.

REGULATION CLOTHING

All clothing you receive from a supply officer in the Navy is regulation clothing. In every case this clothing is made of excellent material and is much cheaper than any you can purchase ashore. Many men want "tailor-made" clothes and spend large sums ashore to get them. In most cases the cloth in these clothes is not as good as in the clothes purchased from the supply officer. The pattern is usually not strictly regulation, and these men frequently get into trouble over this. Get in the habit of buying regulation clothing from the supply officer, for you will never then be wrong. Your ship's tailor can make alterations at very small expense so that your uniform will fit well.

SPECIAL ADVICE ABOUT CLOTHING

Following are some points about your clothing which you must learn at once and must strictly follow. Many men get into serious trouble on some of these points, and this is usually due to men not knowing how these actions are regarded in the Navy. *Never do any of the following things:*

(1) Never lend your clothes to a shipmate. This sometimes leads some one to "borrow" your stuff when you are not around, and serious trouble results.

(2) Never borrow clothes from a shipmate. The reasons for not doing this are the same as for lending clothes. In addition, this is not sanitary, and many times men have developed serious diseases from borrowed clothes.

(3) Never give away or sell clothes. If your name is in the clothes, the man who gets them will have to explain how he got them. If you are not there to verify it, this man will be charged with "clothing of another man in his possession," and this is a serious offense. Selling clothes that are marked is bad business. You never get as much as you have had to pay for them. You will always be "broke" if you develop

this habit. You are sure to be caught at it eventually and this will result in further losses to yourself.

(4) See your company commander if you wish to dispose of any clothing. He will tell you how to do it and get permission from the proper authority for you to dispose of it legally.

FOLDING CLOTHES

You are given a clothes bag in which to stow your clothes. All clothes, before stowing in a bag, should be folded and stopped as follows:

Turn all clothes, except overcoats and underclothes, inside out before folding; brush clean, roll up tightly, smoothing out all the wrinkles, and secure them with a white cotton stop about 2 inches from each end of the roll. The stops are tied in a square knot and the ends tucked inside the roll.

Fold clothes as follows:

Trousers, white.—Fold one leg over the other so that seams on the inside of leg come together and pockets are on the outside. Tuck in the crotch. Turn waistband back to middle of leg and turn back top trouser leg about 6 inches. Roll toward bottom, keeping right edges even.

Trousers, blue.—Fold one leg over the other so that seams on inside of leg come together and pockets are on the inside. Do not tuck in the crotch. Turn waistband back to middle of leg and turn back top trouser leg about 6 inches. Roll toward bottom, keeping left edges even.

Drawers.—Same as trousers, except roll from the bottom of the leg upward.

White and blue jumpers.—Place one sleeve directly over the other, the front of the shirt being on the inside of the fold and the collar extending above the neck with the two side edges together on inside of collar. Fold collar lengthwise of shirt. Fold arms back over collar twice, and roll back from neck toward lower edge of the shirt.

Undershirts.—Same as jumpers, except directions concerning collar.

Overcoats.—Lay the overcoat out flat, outside up, sleeves along side, collar turned down as when worn. Fold back each half of the front over the sleeve nearest it, and then fold one half of the coat over the other half. Fold upper third of the coat over the center third, and lower third back over upper third. Secure with a long stop, lengthwise and crosswise, using a square knot.

Note.—Your name will not show on white trousers if you have your clothes rolled and marked properly. At bag inspection you will be required to undo your stops, and your clothes will then be inspected for cleanliness and for proper marking.

STOWING CLOTHES

Your clothes are stowed in a bag which will be supplied you. You will be shown how to do this by your company commander. The following paragraphs will give you the rules which will help you to remember this.

Your clothes, folded as above, will be stowed in the bag as follows:

Place clothes in bag horizontal and in layers; layers at right angles to each other. When winter uniform is prescribed, summer clothes shall be stowed in bottom of bag, and vice versa. Secure top of bag with lanyard, taking a round turn with both ends on jackstay, and secure with a square knot. Keep overcoat in divisional locker or stow in bottom of clothes bag, as may be ordered.

Men must be careful to keep their bags clean at all times. They will save themselves much labor by doing so. Never drag a bag along the deck, nor put it down except in a clean, dry place.

BAG INSPECTION

Bag inspection is held frequently by your company commanders to teach you how to keep your clothes clean, tidy, properly marked, and up to the allowance you are required to have. Learn to keep your bag always ready for inspection. It is easy when you learn how and saves you a lot of trouble. To pass a good bag inspection is one of the first and most important things that a sailor must learn to do.

When bag inspection call is sounded, go to the bag rack, take your bag, and fall in at the place specified by your company commander. Stand at attention behind your bag. The company commander will then give orders to *"Open ranks"* and *"Lay out bags for inspection."* At this latter command take all your clothes out of the bag, putting all the whites in one pile and all the blues in another. Lay the bag out flat, the bottom toward the company commander. All bags in each rank must be laid in a straight line. Place all clothes on the bag in a single layer of two rows, blue clothes to the right and white clothes to the left (on board ship blue clothes are placed forward and whites aft), the outer ends of pieces being in the same straight line. In Fig. 2-1 the clothing is arranged in the following order, commencing at the bottom of the bag:

(*a*) *Blue clothes.*—Trousers, dress jumper, undress jumper, jersey, overcoat, watch cap, flat hat, leggings, and neckerchief.

(*b*) *White clothes.*—Trousers, jumpers, mattress cover, underwear, towels, hats, and toilet articles, etc. Socks, shoe gear, etc., are placed

between the rows of white and blue clothing. The whisk broom is stood on end between the white and blue trousers.

(*c*) Shoes are placed on the right in the following order: Shoes, gymnasium shoes, and rubber overshoes. Be certain to have the toes of the shoes even with the trousers.

When all bags are laid out as in Fig. 2-1, all men will stand at attention behind their bags. The company commander will then inspect to see

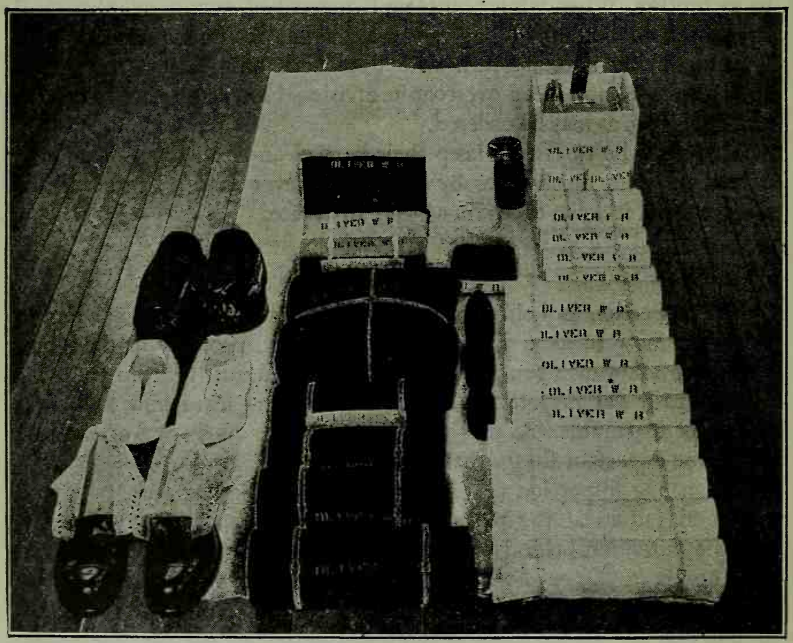


FIG. 2-1—Bag laid out for inspection.

that each man has the required amount of clothing. Those that are short will be required to draw enough to fill up. He will then require all of you to unstop various articles of uniform and hold them up for inspection. He will inspect to see that these articles are of uniform pattern, properly marked, and clean. Clothes that are not of uniform pattern will be confiscated. Clothes not marked, or not marked according to regulations, must be marked at once. Clothes that are not clean must be scrubbed at once.

STOPPING CLOTHES ON LINE

Clothes should be secured on the clothesline by stops made fast to the eyelet holes in each piece of clothing. These stops may be bought from the supply officer or may be made of cod line, neatly wrapped, or of fine canvas threads neatly twisted, waxed, and whipped. If two lines are used, all the blue clothes must be on one line and all whites on the other. If one line only is used, all whites will be together above and the blues together below. Clothes should be stopped on with corners lapping over so they cannot slip down and leave "holidays" (vacant spaces) along the line. When stopping on blankets and mattress covers hitch the clothes stop to the upper corners.

Hammocks must be stopped to the line with three clothes stops, one in each end and one in the center eyelet hole. Take round turn about line with stops and tie a square knot.

The stops of bags should be made fast to the bottom on the inside, either sewed on securely or, preferably, passed through two eyelet holes in the bottom. The bag should be turned wrong side out before stopping on. It is most important to use strong stops with bags and hammocks and to pass them very securely to prevent them from being blown off in bad weather. It is quite inexcusable to lose articles off the line.

CHAPTER 3

GENERAL INFORMATION

Hammocks, lashing, airing, and inspection 16
Cleanliness 18
Field day 18
Inspection 18
Medical service 19
Ship's service (barber, tailor, cobbler) 19
Important points (tips, smoking lamp, lucky bag, pay, tattooing, allotments) 20
Government insurance 21
Library 22
Deposits 22
Friends 22
Gambling 22
Profanity 22
Moral turpitude 23
Athletics, recreation 23
Request mast 23
Captain's mast 24
Seeing the captain and executive officer 24
Officers at training station 24
Officers aboard ship 25

HAMMOCKS

Lashing.—To lash your hammock, first fold your blankets carefully and place in middle of mattress so that ends of blankets come within about 6 inches of ends of mattress. Then roll the mattress as closely as possible and cover this with hammock. Then lash with seven marlin hitches, being careful that the first and last hitches completely close the ends of the hammock over the mattress. Then twist your clews and place them under the hitches.

Airing.—Bedding is aired once a week or oftener, as weather permits. The bugle call is sounded; all hands get hammocks, open them up well so that the air can reach every part of the bedding, blankets outboard, and pillows tucked under clews. Pass hammock lashings through the clews and then take three round turns halfway down to insure that bedding does not come loose. Tuck in all loose ends so that hammock presents a neat appearance. Place hammock so that there are no vacant spaces or "holidays" on the rail.

Inspection.—Hammocks are inspected after they have been piped down, subsequent to airing, or as ordered. At the command *"Lay out hammocks for inspection,"* unlash, and spread out the hammock, the name on the mattress being turned toward the inspecting officer. Fold the mattress cover and the blankets twice crosswise, placing the mattress cover 10 inches from the head and the blankets 10 inches from the foot of the mattress. Throw the clews over the mattress and coil the lashing in the center. Five minutes after the command *"Lay out hammocks for inspection,"* the order *"Attention"* will be given. Men stand at attention at the end of their hammocks until the inspection is over. The inspecting officer inspects all blankets, mattress covers, mattresses, and pillows to see that they are properly marked according to regulations and are clean. See Fig. 3-1 for hammock laid out for inspection. On vessels equipped

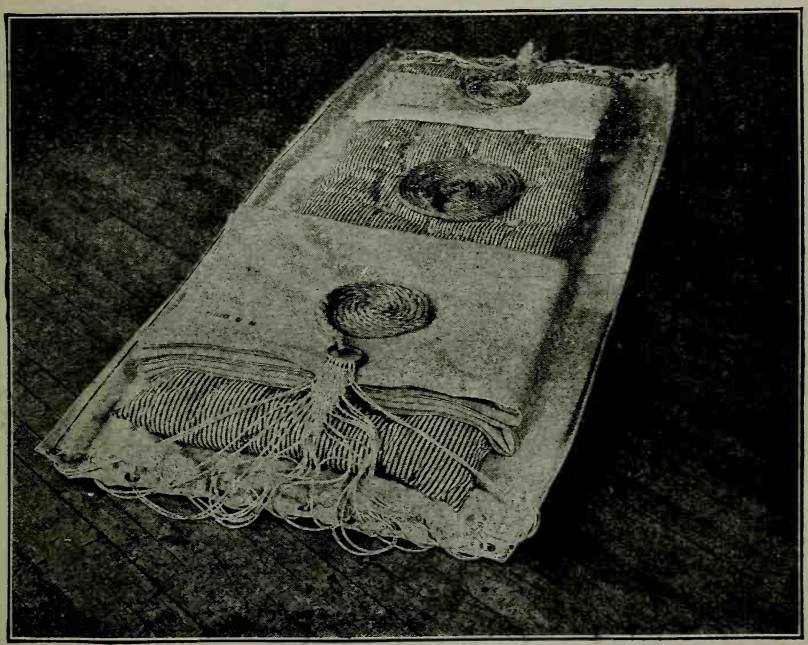


FIG. 3-1—Hammock laid out for inspection.

with bunks, the bedding is laid out without hammocks. The pillow is placed 10 inches from the head, with pillow cover neatly folded upon it. The mattress cover is placed midway between pillow and blankets.

CLEANLINESS

Our Navy is as clean as any navy in the world. Our ships, our stations, and all the men in our Navy set a standard of cleanliness that is not surpassed anywhere. It is up to you to uphold that standard. Learn now to do so. There will now be given a few rules which will help you to attain our Navy's standard of cleanliness.

Be clean in person.—Without this you cannot be respected by anyone, nor can you expect to be chosen for higher positions. Take baths and use your tooth brush frequently. Clean your finger nails. Clean up well after all your drills or work. Change your underwear every time you bathe. Keep in clean uniform. Scrub your work clothes often and always wear clean clothes after working hours. Always keep a good uniform for quarters and inspections. Never store dirty clothes or dirty shoes in your bag. Keep your hammock clean. Keep your shoes shined. Wear a clean hat and wear it square on your head with brim up. Keep your hair cut regulation. Be a snappy man-o'-war's man all the time.

Keep your station clean and always act so as to help everyone else to keep his station clean.—Do not throw ashes or other dirt on the deck. Never spit on the deck. Wipe your shoes clean before entering your quarters. See that the windows, decks, walls, canvas, and sidewalks are clean and kept clean.

FIELD DAY

Field day is the term used in our Navy for a *general house cleaning.* Field days are held once every week, usually Friday. On these days all hands get busy and every nook and corner is cleaned thoroughly.

INSPECTION

Inspection by your company commander is held every day. He inspects your quarters for neatness and cleanliness. He later inspects you in formation for neatness and cleanliness. At regular intervals high ranking officers of your station make further inspections of your quarters and your company. Once every week the commanding officer himself inspects your quarters and formations. In addition to these inspections the medical officers inspect daily the galley and the preparation and serving of your food, and at regular intervals look over each recruit for signs of any disease or sickness.

These inspections are held to guard your health so that your person and station will be kept up to the Navy standard of neatness and cleanliness and so that you will learn to be a real man-o'-war's man.

MEDICAL SERVICE

There is a dispensary at your station with medical officers on duty at all times. Sick call is held twice daily, and if you are not feeling well you can see the doctors at these times. Your company commander will tell you how to get to the dispensary. In case of sudden illness, accident, or any other emergency you can go to the dispensary at any time, day or night. Serious cases of illness are sent to the hospital, while all others are treated in the dispensary.

The medical officers will give you a series of lectures on personal hygiene. Listen carefully to these lectures and try to do what the doctors tell you. You are young and inexperienced and know little of how to take care of yourself. The doctors have learned this from long experience, and they give you these lectures to help you keep your health. In civil life you would have to pay handsomely for the advice these doctors give you. To live a clean, wholesome life, you must think clearly and wholesomely. When you find your mind wandering on unwholesome subjects, snap out of it and turn your mind to clean thoughts. Get interested in clean, manly subjects, such as good books, athletics, shows, etc. See the really worth-while sights in the towns you visit. Do not hang around the dirty places that are always handy and which are always waiting to prey on you. Your position in life as a man-o'-war's man is above such things.

SHIP'S SERVICE

Besides the small stores where you can get all your clothing very cheaply, your station will have the following shops, which come under the term *ship's service,* where you can get real service much cheaper than ashore.

Barber shop.—You get regulation hair cuts and other barber service. Your style of hair cut must be uniform. Your hair on top of the head should not be more than 1½ inches long, and it should be clipped short down the sides, but not so short as to give the impression that your head has been shaved. You seldom get the regulation hair cut ashore, and you usually pay three or more times as much as you do at the station.

Tailor shop.—Alterations to your uniforms are made here very cheaply. Branch marks on your sleeves and rating stripes on the wrist-band are put on for you.

Cobbler shop.—All work on shoes is done here for you very cheaply.

Recreation facilities.—Pool and billiard rooms, photograph shop, and "movies" are available, either free or at very cheap rates.

All men should use the ship's services at all times. A certain percentage of all money paid to these services goes to provide "movies" and other forms of recreation at the station. Similar shops ashore cannot possibly do work as cheaply, and what you spend there is gone forever. They usually get you in difficulties also, because they do not always do work according to regulation pattern.

IMPORTANT POINTS

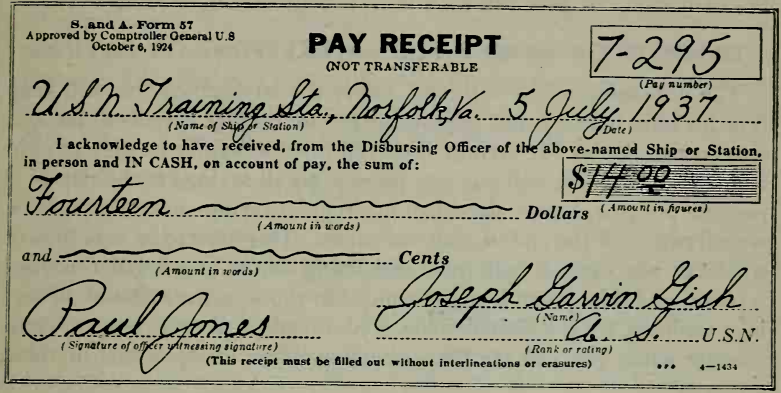
Tips.—Never take tips. An apprentice seaman is already above that station in life.

Smoking lamp.—In the old days, before matches were invented, a lamp was lighted at certain times aboard ship when smoking was permitted. All smokers got their pipes lighted from this lamp. It was easy to regulate smoking in those days, for all they had to do to stop smoking was to put out the lamp. We still have the "smoking lamp" in spirit. Your station has a schedule which tells when the smoking lamp is *lighted* and when it is *out*. Smoke when it is *lighted* but do not smoke when it is *out*.

Lucky bag.—All clothes not called for when the clothesline is piped down and all stray clothes found lying around are collected and put in a safe place called the "lucky bag." These clothes still belong to the person who failed to take care of them. At regular intervals the lucky bag will be opened and the clothes issued to the owners. If the owner was at fault by being careless with his clothes, he will be put on the report and given punishment dependent upon how careless he was.

Pay.—An officer of the supply corps, called the disbursing officer, keeps your pay accounts. He assigns you a pay number and pays you on the 5th and 20th of every month. When you draw small stores, he subtracts the amount of clothes you have drawn. You can always check your own account by remembering what your pay is and subtracting small stores you have drawn and 20 cents hospital fee. All of you must learn to make out your pay receipts properly. Figure 3-2 illustrates a correctly made out pay receipt. Note that the amount of dollars, "Fourteen," is written as far to the left as possible; that a line is made filling in the remainder of this line to the word "Dollars"; that "14" is written close to the dollar ($) sign, and followed closely by "0"; that a line has been made through the line for "cents." All words must be spelled correctly and there must be *no erasures, blots, or writing over.* Sign your pay

receipt with your full name: given name, middle name, and surname. After you sign it, a commissioned officer will countersign it. Then the disbursing officer will pay you if your receipt is made out correctly; otherwise you will be delayed, and might have to wait until next pay day to draw your money.



S. and A. Form 57
Approved by Comptroller General U.S
October 6, 1924

PAY RECEIPT
(NOT TRANSFERABLE)

7-295
(Pay number)

U.S.N. Training Sta., Norfolk, Va. 5 July 1937
(Name of Ship or Station) (Date)

I acknowledge to have received, from the Disbursing Officer of the above-named Ship or Station, in person and IN CASH, on account of pay, the sum of:

$14.00 (Amount in figures)

Fourteen ~~~~~ Dollars
(Amount in words)

and ~~~~~ Cents
(Amount in words)

Joseph Garvin Gish
(Name)

Paul Jones
(Signature of officer witnessing signature)

A. S. U.S.N.
(Rank or rating)

(This receipt must be filled out without interlineations or erasures)

4—1434

FIG. 3-2—Pay receipt.

Tattooing.—Do not get tattooed. Ask any man you see who has been tattooed and he will tell you that he would give anything to have the tattooing removed. It is dangerous, costly, and an awful lot of trouble the rest of your life.

Allotments.—You can make an allotment to a bank for purposes of saving money, or to your relatives for their support. When you make an allotment, a check for this amount is mailed on the first of every month from Washington to whomever you make it. It is the best way to save money or to provide support to your relatives, especially when you start long cruises. It costs you nothing and saves you a lot of trouble. Make use of allotments. Your company commander will tell you when you can go to the disbursing officer to make one out.

GOVERNMENT INSURANCE

This is the cheapest and best insurance for men in the Navy. You can take out any kind of policy up to $10,000. All men having dependents should take out insurance. You must take out this insurance within 120 days after your enlistment. Your company commander will tell you how to get it.

LIBRARY

Your station has been provided with a library of carefully chosen books so that you may have the chance to widen by reading the knowledge you are gaining daily by experience, as well as a pleasant place in which to read and write in your off-duty time. There is also provided a librarian who can give you such library assistance as you may desire.

DEPOSITS OF MONEY FOR SAFEKEEPING OR SAVING

The disbursing officer will hold money for safekeeping. He will keep it in his safe, but he is not responsible in case his safe is robbed. He will also receive money for savings. You can open a regular savings account and the government will pay you interest on all savings at the rate of 4 per cent per year. Money deposited in a regular savings account cannot be withdrawn until the end of your enlistment. This makes you sure to save whatever you deposit with your disbursing officer in a regular savings account, and this system is recommended to you. It is the safest of all savings accounts, for the United States is your bank. Ask your company commander when you can see the disbursing officer to open one of these accounts.

FRIENDS

Your best friends are your company commander and the officers on your station. They are trying to make a real man of you. Behind their strict discipline is the true friendship for you that knows no limits in any emergency. You will develop friends rapidly with your new shipmates. Be careful, however, that you do not pick the occasional "shirk," "piker," or "fourflusher" for your friend, as such a man will invariably get you into trouble in time.

GAMBLING

This is strictly forbidden, and you are severely punished when caught. Card playing, checkers, acey-ducey, chess, etc., when played during recreation periods and for sport, are encouraged.

PROFANITY

Men are profane usually because they lack education and need profane words to express themselves forcibly or because they are naturally evil-minded. In either case men using profane or filthy language have something lacking for development into leaders of men, and they advertise this fact loudly every time they open their mouths. Profanity is not allowed and causes trouble to the man who uses it. One captain of a

ship which was cruising in Central American waters noticed that some men in ordinary conversation were calling each other by the vilest of names in loud voices with no regard for anyone. He issued an order whereby the profane man was to be put on the report for profanity, and the man who was called the vile name was to be put on the report for actually being what he had been called if he failed to take exception to it. The first case of two men being put on the report in accordance with this order caused a sensation. The man who was profane got many hours of extra duty, but the man who calmly took the vile name got a court-martial and had to prove his innocence. Several black eyes were noticed after this, but in a week or so profanity had practically stopped.

MORAL TURPITUDE

Occasionally a person of immoral habits succeeds in joining the naval service. It is your duty to report immediately any suspicion or rumor of lewd, lascivious, and scandalous conduct. You would not hesitate to report a thief, so do not fail to notify the officers of the drill department if you have any suspicion that there is a person of immoral habits in your company. You would not want these men as your associates, so you must help the officers get them out of the service.

ATHLETICS AND RECREATION

The Navy is anxious to have every man go in for some kind of athletics. Nearly every kind of sport is played. Your training station period is short, but you should try some sort of game right away. Aboard ship you will be given far greater opportunities. For recreation you have "movies," swimming, "happy hours," music, and athletic events. An Army and Navy Y.M.C.A. is usually near your station, and you should make use of it immediately. It gives you a fine club life which would cost you a small fortune to enjoy in civil life.

MAST FOR REQUESTS

The executive officer sets aside a certain portion of his time every day that he may listen to requests from members of the crew. In order that these requests be granted, it is needless to say that they must be legitimate ones. In regard to making requests, men must bear in mind two rules: (1) be sure that your request is a reasonable one; (2) unless it is absolutely impracticable by reason of your being on watch or through absence from the ship on duty, make your request at the time set for request

mast. The executive officer is a very busy man; he sets aside a certain portion of his time especially for the purpose of listening to your request, if it be a legitimate one; consequently, he is not apt to give a very favorable reply to a request made at another time unless a man happens to have been on duty when mast was held.

CAPTAIN'S MAST

The captain holds mast to investigate reports and to assign punishments. Captains also hold mast to give awards or commendation to men who have earned them.

SEEING THE CAPTAIN AND EXECUTIVE OFFICER

Men can see the executive officer at the regular mast for requests. They cannot see him at other times without first getting permission from the drill officer or the officer of the day. No man can see the captain without first getting permission from the executive officer.

OFFICERS AT TRAINING STATION

Who Are the Line Officers?

The captain is the officer in actual command of a government vessel or station. He is a line officer and, in case of his absence or death, he is succeeded by the line officer next in rank. His authority over his own ship and crew is supreme, and he is authorized by law to inflict certain punishments in every case of breach of discipline.

The executive officer is the line officer next in rank to the captain. He has entire charge under the direction of the captain of all matters relating to the personnel, routine, and discipline of the ship or station. All orders issued by him are considered as coming direct from the captain and will be obeyed as if the captain had issued them. No one has any right to ask whether a particular order came from the captain. The executive will be obeyed and, if his orders are not approved, he alone is responsible. In case of absence or disability of the captain, the executive officer assumes command.

The drill officer is the line officer next to the executive officer, and he has general charge under the executive of the training, discipline, and care of the men in training at the training station.

The first lieutenant has charge of and is responsible for the cleanliness and upkeep of the training station. At the training station the first lieutenant is called the maintenance officer.

Who Are the Staff Officers?

The medical officers have charge of and are responsible for the health of all individuals in the United States Navy and of the conditions that make for health.

The dental officers are under the direction of the medical department and look after the dental needs of all hands.

The supply officers have charge of the purchasing of supplies for the Navy, the issuing of supplies, including food, clothing, and general naval equipment, and disbursing of pay to the Navy personnel.

The chaplain has charge primarily of the religious interests of the Navy personnel. In addition he is interested in the welfare of the men, their general contentment, their relation to their home people, and to the public.

OFFICERS ABOARD SHIP

You will find the following officers aboard ship and their duties are given as follows:

The captain is in command and is charged with full responsibility for the care and efficiency of the ship and the welfare of all hands. To this end, he has full authority in order to carry out these grave responsibilities.

The executive officer is next in rank to the captain. Under the direction of the captain he has entire charge of all matters relating to personnel, routine, and discipline. He has the same authority and responsibility as indicated in the paragraph in which his duties ashore were discussed.

The navigator is head of the navigation department and is responsible for the safe navigation of the ship.

The gunnery officer is the head of the gunnery department and is responsible for the entire ordnance equipment aboard, and for the proper training of all gun and torpedo crews.

The engineer officer is head of the engineering department and is responsible for all machinery for driving the ship and auxiliaries and for training of all men in the engineering department.

The first lieutenant and damage control officer has charge of and is responsible for the cleanliness of the ship. He is responsible for the water-tight integrity of the ship, repair and upkeep of boats, and general care and repair of the structural parts of the ship.

Watch and division officers have charge of the divisions aboard ship and stand watch as officer of the deck and engineer officer of the watch. They are responsible for the care and upkeep of that part of the ship assigned to their division and for the training of their men.

The medical officer is the head of the medical department, has charge of the sick bay, is generally responsible for the health of all hands aboard, and for conditions that make for good health. He is charged with the inspection of the food, sleeping conditions, general cleanliness, proper ventilation, etc.

The dental officer's duties afloat approximate those ashore.

The supply officer is the head of the supply department and has charge of the general mess, the ship's store, and the issue of clothing and small stores. He has custody of the stocks of provisions, clothing, and general supplies; and has charge of the pay accounts, the purchase of stores, and the payment of proper bills against the ship.

The chaplain is charged with the general religious interests of all hands, has charge of the library, assists in promoting the education of the men, and is interested in their general welfare. He frequently has additional duties with reference to motion pictures and entertainments and often helps in promoting smokers, parties, and various forms of athletics.

CHAPTER 4

RULES AND REGULATIONS

Rules of discipline 27
Respect for authority 28
Good behavior 28
Twofold nature of duty 29
Refusal to obey 29
Result of misconduct 30
Neglect of duty 30
Deliberate violation of orders or regulations 31
Punishments 32

THIS chapter and the following one are of great importance to you. They deal with the principal rules of your military life. Study them carefully and learn to abide by the rules laid down. These rules are based on the *Navy Regulations,* which are regulations made by the Secretary of the Navy, approved by the President, and in accordance with laws passed by Congress. These *Regulations* are no harder than ordinary laws for civil life, but they are strictly enforced.

RULES OF DISCIPLINE

The rules of discipline are:

(1) Obey orders cheerfully and willingly.

(2) Obey the last order received from any responsible authority.

(3) Show respect to your seniors at all times.

(4) Obedience to these rules form a very essential part of your duties, of your daily work, and of what you are paid for. A failure to carry them out will not only result in trouble to yourself, but also will spoil your chances of promotion.

(5) Learn to obey orders promptly, willingly, and completely. Remember that you will soon be a leader and will be giving orders. You will be responsible then to see that those under you obey. You must first learn to be obedient yourself before you can expect to be advanced to a leader of men.

(6) Discipline does not mean short liberties, restrictions of personal conduct, and forced obedience to all sorts of rules and regulations. It means, rather, self-control, a cheerful obedience to necessary laws and regulations, and a square deal to your fellow-men.

RESPECT FOR AUTHORITY

Respect for those placed in authority over you is absolutely essential. To show other than respect, and especially deliberate disrespect for those in authority, is a defiance of authority and one of the most serious offenses of military service.

GOOD BEHAVIOR

The Navy is a profession in which many people spend their entire lives. There is much work to be done, and success in battle, the primary aim in every military organization, necessitates implicit obedience to orders. It necessitates that men be trained to do instinctively everything that must be done in battle when under the fire of the enemy. Briefly, discipline is the habit of obedience by which a man obeys an order naturally and without question, without stopping to consider whether he wants to obey it or not; he must learn to obey simply because the order comes from higher authority. Discipline, therefore, is based upon a respect for authority. It means that you must hold higher in your esteem than anything else the authority that is placed over you. If you are disrespectful to an officer or to a petty officer, your offense lies not so much in the fact that you are disrespectful to him personally as it does in the fact that he temporarily represents the supreme authority, and it is the failure of many enlisted men to grasp this fact that often gets them into trouble. The fact that you may be a good man in your line of work does not overcome the necessity for good behavior. The Navy differs from civil life. In most jobs ashore all that is required of you is a certain number of hours of good hard work every day. In the Navy, on the other hand, *discipline is necessary for success in battle,* and the only object of the Navy is to win battles. Therefore, good behavior and implicit obedience are primarily essential. The Navy can take a good man and train him to do his work properly, but a man is required to take an oath, before enlisting, that he will obey the *Regulations.* Many advantages, such as pay, retirement, and honorable discharges, are based more on good behavior than on skill in any particular duty. The fact is that, whatever your rating, your promotion depends on your excellence in both of these features. If you cannot behave, obey the *Regulations,* and comply with your oath, you are unfit to carry out the various work of the service, and the Navy has no time to waste on you. On the other hand obedience, a cheerful disposition, a helpful hand, a willingness to work, a will to study, and a desire to succeed in life will insure success for any man in our Navy.

THE TWOFOLD NATURE OF DUTY IN THE NAVY

When a man enlists in the Navy, no matter what rating, the natures of his duties are twofold. The duties are (1) his *military duties* and (2) *the special duties of the rating in which he enlists.*

No matter what his length of service may be or what his rating is, every recruit, every enlisted man, has certain duties of a military nature quite apart from the duties of this rating. These military duties are a part of the military service to which he belongs, and the fact of these military duties cannot be too strongly impressed upon each man. Even though the duties of his rating may be such as to reduce the amount of his military duties—for example, to lessen the amount of drill—nevertheless, the military side of the profession is always present and its responsibilities are always in evidence. However expert a fireman or a machinist's mate, a yeoman, or a cook a man may be, he must realize that when he enlists in the Navy, skill in his rating constitutes only part of his duty. In addition to showing that he is competent to perform the duties of his particular rating, he must place himself under military laws and regulations which are quite different from the laws which govern him in civil life. And it is the neglect of the military half of a man's duties that causes a very large percentage of the trouble he may experience in the Navy. A number of men fail to realize just what this military side of life in the Navy involves. In a general way they know that they must be obedient and respectful, but they do not seem to understand the real importance of being so. They do not realize that failure to be respectful and obedient will injure their records and ruin their chance for promotion.

REFUSAL TO OBEY

If you neglect to obey an order or refuse to obey it, you will not be sustained in your action once in a thousand times. If an officer or petty officer orders you to do a certain thing, and, before it is done, another officer or petty officer orders you to do something else, it is your duty to inform the officer or petty officer giving you the second order that you have had previous orders, telling him what the orders are and who gave them to you. The officer or petty officer who gave you the second order will then decide whether you are to carry out the first orders or the second orders.

If the officer or petty officer instructs you to carry out the second orders which he himself gave, then it is your duty to carry them out. As soon as you have done so, endeavor to carry out your first orders. If there has been any considerable change or delay, report to the officer or petty

officer giving you the first orders the fact of the change or delay and the reason therefor.

If an order is received from the officer of the deck, it must be carried out without delay, as he is the representative of the commanding officer and the executive officer and is responsible for the safety of the ship. If the carrying out of such an order from the officer of the deck necessitates any considerable delay or change in your carrying out later any previous order you may have received, you should report such facts to the officer or petty officer from whom you received the first order.

RESULT OF MISCONDUCT

You must understand clearly what will be the result of misconduct. Military offenses may be divided into two general classes: (1) those involving neglect of duty, and (2) those involving deliberate violation of orders, regulations, or instructions.

Misconduct is punished according to the nature and degree of the offense.

NEGLECT OF DUTY

Offenses under this classification may vary in nature from minor cases —as, for example, "late at muster" or "slow in sweeping down"—to neglect, the result of which may involve collision, sinking of the ship, or loss of life—as, for example, putting the rudder the wrong way or neglecting to close water-tight doors when it is your duty to do so. Owing to the great variety of these offenses and the different kinds of "neglect of duty," which extend all the way from mere trivialities to great catastrophes, punishment for "neglect of duty" varies all the way from loss of liberty to that inflicted by sentence of a general court-martial. The object of punishing for neglect of duty is to enforce discipline, to make people careful, thorough, and reliable in whatever they do. In battle even a slight neglect or one careless act on the part of any one man may mean the difference between victory and defeat. The old maxim "Whatever is worth doing at all is worth doing well" applies more forcibly to duty on a man-o'-war than to duty anywhere else. If an officer gives you an order he counts not only upon your carrying it out, but also upon your executing it thoroughly and completely. He also relies upon your coming to him and telling him if, for any reason, you cannot execute the order properly and thoroughly. This necessity of thoroughness enters into every feature of life on board ship. Neglect of thoroughness, neglect to do your duty—whatever may be your rate—may have tremendous consequences. Nelson signaled before a great battle: *"England expects every*

man to do his duty." Even in those days it was realized that success in battle depended not only upon the captain but also upon every individual man doing *what* he was supposed to do, and *all* that he was supposed to do. You may say, "That is all right in action, but why is such strict thoroughness necessary in time of peace?" This "little talk" is just for the purpose of answering questions such as this. In this case the answer is: "Because it is necessary 'in time of peace to prepare for war.'" It is necessary in time of peace to train everyone to do his duty thoroughly. If we didn't practice with our guns, and if we didn't use our engines and our torpedoes in time of peace, we wouldn't know how to use them efficiently in time of war. All of our work in times of peace—carried on at great expense—is for the purpose of insuring our readiness when war is declared.

One of the most important features of training is the schooling of personnel in thoroughness and impressing upon everyone in the service the meaning of the word *duty*. Remember the old saying that "wooden ships with men of iron will defeat iron ships manned by wooden men." There is a word the meaning of which you should master at the very outset of your career, a word that, while you are in the service, you should hold sacred. That word is *duty*. You must work from "sense of duty." This means that you should do a thing not merely because you *have to* do it, or because you will be *caught* if you don't do it, but it means that you must carry out orders because it is your *duty* to carry them out. Do the things that you are ordered to do just as carefully and thoroughly when you are off by yourself as you would do them if you were being supervised.

DELIBERATE VIOLATION OF ORDERS OR REGULATIONS

Offenses of this nature are so serious that the offenders are usually tried by court-martial. In this case the offense, as a rule, lies not so much in the consequences of the act as in the defiance of authority. Discipline requires that authority be held supreme and sacred. Such offenses are severely punished because, since they are deliberate, they defy the supreme authority, and it is seldom indeed that excuses, such as ignorance, or drunkenness, or excitability, or the fact that the man who gave the order had no authority to give it, are accepted. You must accept as supreme the authority placed over you, and *you must obey that authority.* Obedience is a habit. It is just as easy to obey as it is not to obey. Besides you have taken an oath to obey. As previously stated, if you get conflicting orders it is not your business to decide which you will obey. Tell the

man who gave you the last order and let him decide whether you are to obey his order or the one previously given. This decision is his privilege, not yours, and if you try to decide for yourself you will surely get in trouble.

PUNISHMENTS IN THE NAVY

Punishments may be assigned in four different ways:

Punishment by captain.—The captain is authorized to assign certain punishments sufficiently severe to punish minor offenses only. He may adjudge solitary confinement on bread and water not in excess of 5 days, or solitary confinement not in excess of 7 days, or deprivation of liberty on shore, or reduction of a rating established by himself, or extra duties. He is also authorized to discharge you at any time in your first enlistment for "inaptitude" or as "undesirable."

General court-martial.—In case of a very serious offense, the President of the United States, the Secretary of the Navy, the commander in chief of a fleet or squadron, and other authorized officers may order a general court-martial. This court may sentence a guilty person to imprisonment at hard labor, loss of pay, and dishonorable discharge. The prison term may vary from 6 months to any number of years, depending upon the offense.

Summary court-martial.—For a less serious offense the captain orders you tried by a summary court-martial. Such a court can sentence you to 30 days' solitary confinement on bread and water, or confinement not exceeding 2 months, or reduction in rating, or deprivation of liberty on foreign station, or bad-conduct discharge. Extra police duties and loss of pay not to exceed 3 months may be added to any of the above punishments.

Deck court.—If the captain thinks you should get more severe punishment than he is authorized to assign, but that your case is not sufficiently serious for a summary court-martial, he may order a deck court. Such a court is authorized to impose any punishment prescribed for a summary court-martial, except that it may not adjudge discharge from the service, or adjudge confinement or loss of pay for a longer period than 20 days.

CHAPTER 5

RULES AND REGULATIONS—Continued

Unauthorized absence 33
Desertion 36
Fraudulent enlistment 37
Fines 38
Summary 38
Theft 39
Articles for the government of the Navy 39
Redress of wrongs 39
Fighting and disturbances 40

UNAUTHORIZED ABSENCE

THIS is the most frequent offense committed by enlisted men. It takes numerous forms, varying in degree from the man who is delayed in returning to the ship for reason of blockade of traffic or one who is not called in the morning to the man who deliberately remains out for months or years. It is such a common offense that some enlisted men do not consider it as a serious breach of discipline, and when they are severely punished for it they feel that they have been unfairly treated. The fact that a man deliberately overstays his leave is, of course, a serious military offense regardless of his reason for overstaying, and this fact must be clearly understood. Overstaying leave accidentally or through no fault of your own, due, for example, to a railroad wreck or to a blockade in traffic, is no offense, and your excuse will be accepted if your record is clear and your reputation such that you have never given reason for your word to be doubted. You must realize, however, that, even in the case quoted, if your record and your reputation are bad, officers who hear trumped-up excuses every day are merely human, and they may not believe your story. This is another example of the necessity for keeping your record clear. Overstaying leave accidentally, which, despite the accident, involves neglect on your part—such, for example, as oversleeping—is an offense, but it is not serious provided you get back as quickly as possible after you wake up. "Late trains" are excuses so often used that men frequently back up their own word by securing a written statement from the conductor as to how many

hours the particular train was late. Such statements assist the commanding officer in selecting the "genuine" excuses from the "trumped-up" ones.

Overstaying leave deliberately for any reason whatever is a very serious offense, because it defies the authority placed over you. For example, suppose you have orders to return at 8:00 A.M. If at 8:00 A.M. you deliberately fail to return, whether it is because you want a longer liberty, or because you have some friends with you, or because of business, or sickness, you practically say: "I know I am ordered to be back, but I will stay as long as I wish and then let them punish me." In this manner you are deliberately disobeying an order, and this is a military offense of the most serious nature. So many excuses are offered for this offense that it may be well to consider some of them.

Intoxication.—Some men give as an excuse that they were intoxicated at 8:00 A.M. and stayed on shore to sober up. It is unnecessary to say that there is never any excuse for your being intoxicated; but if, by any chance, you should feel intoxicated or in need of sleep when your liberty is up remember that the ship is the best place for you. If you return to the ship in such a condition and raise no disturbance, your offense will be less serious than it would be if you had overstayed your leave; consequently your punishment will be lighter.

Sickness.—Men sometimes state that they were sick and bring the certificate of some doctor. If you are really seriously sick, that is, of course, an excuse. But a doctor's certificate doesn't always prove that fact, for the reason that occasionally men purchase fake certificates or falsify them. For this reason, the commanding officer frequently checks up on such certificates and, where found to be faked or falsified, the man is punished not only for the actual offense but also for attempted deception and lying to his commanding officer.

If you are sick and will likely not be able to return to your ship on time, the proper thing to do is to get word to the ship immediately, or contact a naval dispensary if one is in that vicinity, giving your address and condition. Then whatever is possible will be done for you. Instead of doing this, if you take affairs into your own hands your certificate may have to be checked up and you may be punished for being overtime.

Sickness in the family is sometimes used as an excuse, but this is not a valid excuse unless you have communicated with the ship. You always have time to telephone or telegraph. If you do this before your leave has expired, it creates a presumption in your favor, especially if you have a clear record, as it gives the ship's authorities a chance to com-

municate with you. Moreover, it shows that you desire to comply with regulations.

Requests of the family.—Without realizing the seriousness of infractions of discipline, mothers or other members of the family sometimes persuade men to overstay leave, and they occasionally appear as witnesses before a court. Remember always that this is never an excuse. *You are under oath to obey the Regulations of the Navy and no one can relieve you of that duty.* Your punishment is just as serious if you remain away at the request of your mother as it would be had you remained away of your own accord.

Detained by civil authorities.—Men sometimes give as an excuse that they were held by the civil authorities. The law on this subject is that if men are tried and acquitted by civil authorities they are not to blame, and no punishment is assigned for the absence due to their being thus held; but if they are held by the civil authorities and found guilty of some misconduct, they have been held for reason of their own misconduct, and hence on their return to the ship they will be punished for overstaying their leave. If detained by civil authorities for any cause whatever, you should notify your ship as soon as possible, giving the facts in the case.

Missing ship.—It frequently happens that men overstay liberty just before a ship sails, miss their ship, and give themselves up on another ship. In this case they are punished. They lose pay and receive punishment for the entire time they are absent from naval control. This punishment is given because a man's duty is on the ship to which he is attached; there is where he is needed, and during his absence other people must do his duty. If their ship is sailing from the United States, such men are immediately declared deserters. Therefore, if your ship has sailed, try to report on board. If this is impossible report to the nearest ship or station.

Stretching overtime to the limit.—There is one feature about absence over leave that shows up in a very large number of courts-martial. A man gets out of money, or oversleeps, or for one reason or another finds himself overtime. Thinking he will then be punished anyway, he does not return immediately, but stays away until just before the charge of overtime becomes desertion, under the belief that the punishment will be the same or that he might as well be away 8 or 9 days as 2 or 3. This is the worst mistake you can make. Always return just as soon as possible. The sooner you get back the easier will be your punishment and the more likely will the officers be to accept your excuse. Officers always try to help

a man who seems to be trying to help himself. It is the deliberate acts which are punished severely, and the longer you remain away the more severe your punishment will be. Never remain away because you feel that you will be punished anyway.

DESERTION

Desertion consists of absence from station and duty with the intent to leave the service permanently. A man is guilty of desertion if at any time he shows the intention of quitting the service permanently before his term of enlistment expires. Many facts serve to indicate such intent—for example, the disposal of uniform, going away and establishing oneself, failing to make any attempt to return, etc. Much the same excuses as those offered in case of absence over leave are given to courts as reasons for desertion. Few men realize how frequently deserters are captured. About 7 out of every 10 who desert are either captured or voluntarily surrender. Many times deserters are captured by the civil police (who keep up with all deserters) after they have been married and have families. Frequently they are captured several years after their desertion when they think it perfectly safe to return to their homes. The civil police are all over the United States and many of them make extra money through the rewards which they receive by apprehending deserters. They keep a list of deserters, their home addresses, and other facts that assist them to recover deserters. Likewise, there are few enlisted men who really understand the effect of desertion. If men could but read the appealing letters from mothers, wives, and sweethearts concerning those men who have been taken from them to serve prison sentences because of desertion, no one would ever desert. These letters tell of the sorrow and shame of having a son or a husband in prison. Often relatives are left penniless due to the fact that a man loses all pay while in prison. Hundreds of such letters are received by the Navy Department every month. Often these letters tell how good a son, or a brother, or a husband the man has been. But rarely, if ever, do these letters avail anything, for the simple reason that the Department is punishing the man for a certain specific act (deserting) which he committed, and all his goodness to his family cannot remove from his record this violation of the law. It often happens that a man's imprisonment is as much of a punishment to his family as to himself, but since he brought it upon himself he has only himself to blame. This is written in the hope that before deserting, before allowing your family or your sweetheart to persuade you to remain home, you will seriously consider this

side of the question. There are certain things to remember about desertion and absence over leave:

(1) It is always better to surrender than to be arrested and brought back.

(2) It is better to surrender in uniform than in civilian clothes.

(3) The sooner you surrender the better. The less time you remain out, the better off you will be.

(4) There is never any excuse for an unauthorized absence of over 24 hours without communicating with the ship.

(5) There is never any excuse for desertion that can be accepted by any court.

(6) The punishment for prolonged absence over leave is nearly always a general court-martial, and if found guilty the sentence may be confinement in prison.

(7) Finally, when you are in prison, your family and dependents suffer as much as you do, oftentimes more than you do, for while you are in prison at least you are fed.

(8) Imprisonment up to 2 years, to which may be added a period equal to the period of absence, may be imposed upon a person for desertion. This is not only a long time to remain in prison, but it is also a blot on your future career. The following is taken from a deserter's statement:

> I deserted on account of my sister being sick. I could not get liberty, and I ran away from the ship and went to see my sister. I did not intend to desert, and would like to be restored to duty.

This is an actual case and is typical of a very large number of statements. In this case the sentence was 18 months in prison. If the man had behaved, had had a clear record, and if his sister had really been sick enough to necessitate his presence, in all probability he could have obtained the desired permission. The question arises whether the pleasure of remaining at home was worth the punishment of 1½ years in prison on reduced fare, at hard labor, and loss of all pay during that time.

FRAUDULENT ENLISTMENT

Many men leave the service by desertion or by receiving a bad-conduct discharge due to their own misbehavior and then, after they get outside, they realize that the Navy is a fine place. They re-enlist fraudulently by falsely concealing the fact that they have been in the service before. Since the finger-print system has been in operation, every single case of fraudu-

lent enlistment has been detected. It isn't a question of being recognized. Finger prints are easily cataloged. They are all compared, and if you have been in the service before you will certainly be detected and sent to prison. The real offense lies in the fact that by your false representations you have led the recruiting officer to enlist you and that you receive money due to your false statements. If you have left the service without recommendation for re-enlistment, the only thing to do is to endeavor to obtain permission from the Navy Department to re-enlist. Any other method will land you in prison.

FINES

A number of men have dependent relatives. Whether these men are sent to prison or merely fined by a summary or deck court-martial on board ship, their allotments must cease and their relatives suffer thereby. Your money is given to you for your services. Remember that the government and your officers prefer not to fine you. The government doesn't need the money. It does need your service and your good behavior; therefore, give the government your services and keep the money for yourself and your family.

SUMMARY

(1) Be careful always to keep your record clear.

(2) A man with a clear record can get permission to do nearly anything within reason.

(3) Never take the law into your own hands. Always get permission to do anything that requires special permission.

(4) In case of unavoidable absence, always communicate with the ship *immediately*.

(5) If absent over leave, remember the sooner you return to your ship the better. Don't make a bad matter worse by prolonging your absence.

(6) No excuse that you can possibly give will keep you out of prison if you are convicted for desertion.

(7) A large percentage of deserters are captured, sometimes years after desertion, and returned to prison. Of the number of men who desert, a larger percentage are being captured each year.

(8) Endeavor to make good all the time.

(9) Endeavor to learn all about your own particular duties, and then a little more.

(10) Remember that the deliberate violation of the orders of a

senior, even if he be only an acting third-class petty officer, is a defiance of the supreme authority and of the laws of the United States as well as a violation of the oath you have taken upon enlistment.

THEFT

In a body as large as the enlisted force of the Navy, a few dishonest men are bound to be encountered. In addition to this small percentage, there are some men, in other respects of unimpeachable honesty, who seem to have elastic consciences in regard to theft of clothing. To steal a shipmate's clothing is an act just as criminal as it is to steal his watch and money. Some men, too, are careless in this matter. They take another man's clothes from the line or pick them up about the deck and appropriate them to their own use. If you have another man's clothing in your possession you subject yourself to the suspicion of theft. "The Articles for the Government of the Navy" establish punishment of theft with from 2 to 4 years of confinement and a dishonorable discharge. The term of confinement is served in the penitentiary. Consequently, a man after serving out his sentence leaves the Navy branded for life as a criminal. Stop to consider that if you have in your possession the clothing of a shipmate, no matter how you obtain it, unless by official authority, you may be sentenced to a term in the penitentiary. A good rule to remember is the excellent advice: "Avoid not only evil, but every appearance of evil." Some men have been known to pawn articles belonging to a shipmate with the intention of redeeming the articles at a later date and restoring them to their owner. Needless to say, no matter what the intent may be, a man guilty of this dishonesty will be court-martialed for theft.

"ARTICLES FOR THE GOVERNMENT OF THE NAVY"

"Articles for the Government of the Navy of the United States" are articles approved by act of Congress and thus made into the law of the land for the government of the Navy. The general features of the *Navy Regulations* are founded on these articles. They are always posted on the ship's bulletin board. Once a month they are read at muster. Every person in the Navy should read these articles carefully and make himself familiar with their general nature.

REDRESS OF WRONGS

"If any person in the Navy considers himself oppressed by his superior, or observes in him any misconduct, he shall not fail in his respectful bear-

ing toward him, but shall represent such oppression or misconduct to the proper authority. He will be held accountable if his representations are found to be vexatious, frivolous, or false. Any application for redress of wrong shall be in writing through the immediate commanding officer to the commander in chief of the fleet or squadron, or to the senior officer present, and it shall be the duty of the latter to take such action in the matter as, in his judgment, justice and good service demand."

FIGHTING AND DISTURBANCES

Before you entered the Navy you may have settled your disputes by fighting. To strike another person in the naval service is an offense punishable as a court-martial may adjudge. If you have any cause for argument, take the matter up with your company commander. You must not take these matters into your own hands.

In the event of a riot or quarrel between persons belonging to the Navy, it shall be the duty of the senior line officer present to suppress the disturbance and, if necessary, to arrest those engaged in it even though they may be his superiors in rank; and *all persons belonging to the Navy who may be present shall render prompt assistance and obedience to the officer* thus engaged in the restoration of order. Should there be no line officer present, the senior officer of the Navy or of the Marine Corps who may be present shall exercise the same authority and be entitled to the same obedience.

RULES REGARDING SALUTES

See chapters 6 and 7.

CHAPTER 6

SCHOOL OF THE RECRUIT

Position of attention 41
Salute with the hand 42
The rests 42
Eyes right or left 43
Facings 43
Steps and marching 44
To face in marching 46
To change step 47

THE FOLLOWING instructions will assist you in grasping the details of your infantry drills. Study and practice the different movements until you know them thoroughly. This chapter gives instructions without arms.

POSITION OF ATTENTION

Heels on the same line and as near each other as the conformation of the man permits.

Feet turned out equally and forming an angle of 45 degrees.

Knees straight without stiffness.

Hips level and drawn back slightly; body erect and resting equally on hips; chest lifted and arched; shoulders square and falling equally.

Arms hanging straight down without stiffness, so that the thumbs are along the seams of the trousers; back of the hands out; fingers held naturally.

Head erect and squarely to the front; chin drawn in so that the axis of the head and neck is vertical; eyes straight to the front.

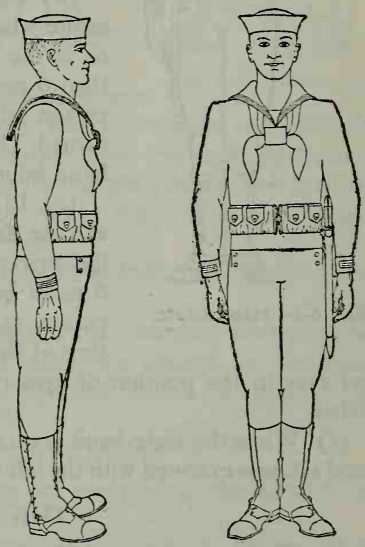


FIG. 6-1—Position of attention.

Weight of the body resting equally on the heels and the balls of the feet.

In assuming the position of attention, the heels are brought together smartly and audibly (See Fig. 6-1).

SALUTE WITH THE HAND

(*a*) Command: 1. *Hand,* 2. *SALUTE,* 3. *TWO.* The command *TWO* is used only when executing the salute by the numbers.

(*b*) At the command *SALUTE* raise the right hand smartly until the tip of the forefinger touches the lower part of the headdress above and slightly to the right of the right eye, thumb and fingers extended and joined, palm to the left, upper arm horizontal, forearm, inclined at about 45 degrees, hand and wrist straight; at the same time turn the head and eyes toward the person saluted.

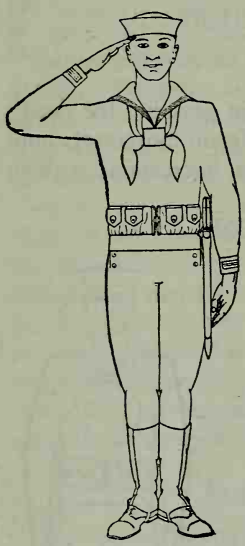


FIG. 6-2—Hand salute.

(*c*) At the command *TWO,* or as indicated in (*d*) and (*e*) below, drop the arm to its normal position by the side in one motion, at the same time turning the head and eyes to the front.

(*d*) Execute the first position of the hand salute when 6 paces from the person saluted, or at the nearest point of approach, if more than 6 paces. Hold the first position until the person saluted has passed, or the salute is returned. Then execute the second motion of the hand salute.

(*e*) In passing in review at ceremonies execute the hand salute similarly, except that the first position of the salute is held until 6 paces beyond the person saluted. Look the person saluted squarely in the eyes at the time of the salute and thereafter hold the head and eyes in the position of eyes right (left) until the salute is completed.

(*f*) When the right hand is occupied and cannot be disengaged, the hand salute is executed with the left hand.

THE RESTS

(a) The commands are: *FALL OUT; REST; AT EASE;* and 1. *Parade,* 2. *REST.*

(*b*) Being at a halt, at the command:

(1) *FALL OUT.* Men leave ranks but are required to remain in the immediate vicinity. Men resume their former places at attention at the command *FALL IN.*

(2) *REST.* The right foot is kept in place. Silence and immobility are not required.

(3) *AT EASE.* The right foot is kept in place. Silence but not immobility is required.

(4) 1. *Parade,* 2. *REST.* Move the left foot smartly 12 inches to the left of the right foot; at the same time, clasp the hands behind the back, palms to the rear, thumb of the right hand clasping the left thumb; arms hanging naturally, without constraint. Preserve silence and immobility, except that the head and eyes may be turned toward the instructor or unit commander.

(*c*) Being at any of the rests except *FALL OUT,* to resume attention, the command is 1. *Squad.* 2. *ATTENTION.* Take the position of attention.

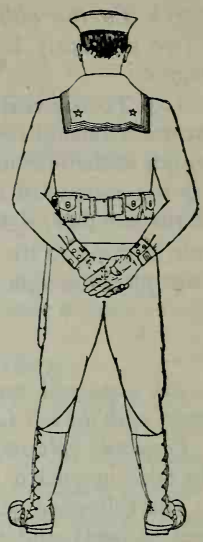


FIG. 6-3—Parade rest.

EYES RIGHT OR LEFT

(*a*) Command: 1. *Eyes,* 2. *RIGHT (LEFT),* 3. *FRONT.*

(*b*) At the command RIGHT, each man turns his head to the right, except the guide and, when in line, the man on the right in the rear rank and the man on the right in the line of file closers. The eyes are fixed on the line of eyes of the men in, or supposed to be in, the same rank.

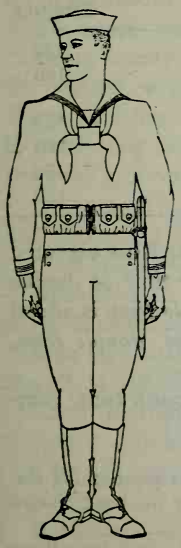


FIG. 6-4—Eyes right.

(*c*) At the command *FRONT,* turn the head and eyes to the front.

(*d*) Being in march, the command *Eyes* is given when the left foot strikes the ground, the command *RIGHT* when the left foot strikes the ground the next time.

FACINGS

(*a*) All facings are executed in the cadence of quick time.

(*b*) ***To the flank.***—Command: 1. *Right (left),* 2. *FACE* (Two motions.) At the command *FACE,* slightly raise the left heel and right toe; face to the right, turning on the right heel, assisted by a slight pressure on the ball of the left foot. Hold the left leg straight without stiffness. (*TWO*) Place the left foot beside the right.

(c) ***To the oblique.***—Command: 1. *Right (left) half,* 2. *FACE.* (Two motions.) Execute half face as prescribed above, facing but 45 degrees.

(d) ***To the rear.***—Command: 1. *About,* 2. *FACE* (Two motions.) At the command *FACE,* carry the toe of the right foot about a half-foot length to the rear and slightly to the left of the left heel without changing the position of the left foot; weight of the body mainly on the heel of the left foot; right leg straight without stiffness. (*TWO*) Face to the rear, turning to the right on the left heel and on the ball of the right foot; place the right heel beside the left.

STEPS AND MARCHING

All steps and marchings executed from the halt, except *right step,* begin with the left foot.

Forward, half step, halt, and *mark time* may be executed one from the other in quick or double time.

The following table prescribes the length (in inches measured from heel to heel) and the cadence (in steps per minute) of the steps in marching.

Step	Time	Length	Cadence
Full	Quick	30	120
Full	Double	36	180
Full	Slow*	30	
Half	Quick	15	120
Half	Double	18	180
Side	Quick	12	120
Back	Quick	15	120

All steps and marchings and movements involving march are executed in quick time unless the squad be marching in double time or double time be added to the command; in the latter case *double time* is added to the preparatory command. Example: 1. *Squad right, double time,* 2. *MARCH.*

Quick time.—Being at a halt, to march forward in quick time, command: 1. *Forward,* 2. *MARCH.*

* This is a special step executed only as the funeral escort is approaching the place of interment. The cadence, in accordance with that set by the band, varies in different airs that may be played.

The instructor, when necessary, indicates the cadence of the step by calling *one, two, three, four* the instant the left and right foot, respectively, should be planted.

At the command *Forward,* shift the weight of the body to the right leg without perceptible movement.

At the command *MARCH,* move the left foot straight forward a full step, sole near the ground, and plant it without shock; next, in like manner, advance and plant the right foot; continue the march. Swing the arms about 6 inches to the front and about 3 inches to the rear of the body.

Being in march in double time, to resume the quick time, command: 1. *Quick time,* 2. *MARCH.*

At the command *MARCH,* given as either foot strikes the ground, advance and plant the other foot in double time; resume the quick time, dropping the hands by the sides.

Double time.—Command: 1. *Double time,* 2. *MARCH.*

Being at a halt, at the command *Double time,* shift the weight of the body to the right leg without perceptible movement. At the command *MARCH,* raise the forearms, fists closed, knuckles out, to a horizontal position along the waistline; take up an easy run with the step and cadence of double time, allowing a natural swinging motion to the arms.

Being in march at quick time, at the command, *MARCH,* given as either foot strikes the ground, take one step in quick time and then step off in double time.

To mark time.—Command: 1. *Mark time,* 2. *MARCH.*

Being in march, at the command *MARCH,* given as either foot strikes the ground, advance and plant the other foot; bring up the other foot in rear, placing it so that both heels are on line, and continue the cadence by alternately raising and planting each foot. The feet are raised 2 inches from the ground.

Being at a halt, at the command *MARCH,* raise and plant first the left foot, then the right foot, and so on as prescribed above.

Half step.—Command: 1. *Half step,* 2. *MARCH.*

Take steps of 15 inches in quick time and 18 inches in double time in the same manner as in the full step.

Side step.—Being at a halt or mark time, command: 1. *Right (left) step,* 2. *MARCH.*

Carry the right foot 12 inches to the right; place the left foot beside the right, left knee straight. Continue in the cadence of quick time.

The side step is used for short distances only and is not executed in double time.

Back step.—Being at a halt or mark time, command: 1. *Backward,* 2. *MARCH.*

Take steps of 15 inches straight to the rear.

The back step is used for short distances only and is not executed in double time.

To halt.—Command: 1. *Squad,* 2. *HALT.*

When marching forward in quick time, backward, or marking time, at the command *HALT,* given as either foot strikes the ground, plant the other foot as in the movement being executed; raise and place the first foot by the side of the other.

Being in march in double time, at the command *HALT,* given as either foot strikes the ground, plant the other foot as in double time, then halt in two counts as in quick time.

When executing right (left) step, at the command *HALT,* given as the heels are together, plant the foot next in cadence as in the movement being executed, completing the halt when the heels are next brought together.

TO FACE IN MARCHING

(*a*) There is no specific command to face in marching. This movement is executed as a part of another movement and either at the command for the other movement or subsequently at an appropriate time. For example, No. 1 of the front rank of the leading squad executes a face to the right in marching at the command: 1. *Column right,* 2. *MARCH,* whereas other No. 1's execute the movement successively upon reaching the pivot and without command.

(*b*) To face in marching and advance from a halt.—Turn in the designated direction on the ball of the right foot and at the same time step off in the new direction with the left foot with a half step, full step, or in double time, as the case may be.

(*c*) To face in marching and mark time from a halt.—Turn in the designated direction on the ball of the right foot and at the same time raise the left foot and place it beside the right foot and mark time.

(*d*) To face to the right (left) in marching and advance, being in march.—When the turn is to be made on a command of execution (given as the right foot strikes the ground), advance and plant the left foot, then turn to the right on the ball of the left foot and at the same time step off in the new direction with the right foot at a half step, full step, or in double time, as the case may be. The aforementioned principle is also applicable to individuals making the turn without command, as in successive movements.

(*e*) To face to the right (left) in marching and mark time, being in

march.—Execute similarly as above except that at the same time the turn is made on the ball of the left foot, raise the right foot and place it beside the left foot as in mark time.

(*f*) In movements, such as in the turn on the fixed pivot at a halt, wherein a definite number of steps is required, the execution of the prescribed face in marching by certain members of the squad is not always possible. For such cases, facing on the ball of either foot is authorized.

To march by the flank.—Command: 1. *By the right (left) flank,* 2. *MARCH.*

Being in march, at the command *MARCH.* the movement is executed as prescribed in (*d*) "To face in marching."

Being at a halt, at the command *MARCH,* the movement is executed as prescribed in (*b*) "To face in marching."

To march to the rear.—Command: 1. *To the rear,* 2. *MARCH.*

Being in march in quick time, at the command *MARCH,* given as the right foot strikes the ground, advance and plant the left foot; turn to the right about on the balls of both feet and immediately step off with the left foot.

Being in march in double time, at the command *MARCH,* given as the right foot strikes the ground, turn to the right about, taking 4 steps in place, keeping cadence; then step off with the left foot.

TO CHANGE STEP

Command: 1. *Change step,* 2. *MARCH.*

Being in march in quick time, at the command *MARCH.* given as the right foot strikes the ground, advance and plant the left foot; plant the toe of the right foot near the heel of the left foot and step off with the left foot. The change may be similarly executed on the right foot, the command *MARCH* being given as the left foot strikes the ground.

Being in march in double time, at the command *MARCH,* given as either foot strikes the ground, take one hop on the next foot and continue the march.

CHAPTER 7

MANUAL OF ARMS

Rules governing carrying of rifles 48
Rules governing execution of manual of arms 49
General rules for loading and firing the rifle 57

RULES GOVERNING CARRYING OF RIFLES

(1) The rifle is not carried with cartridges in either the chamber or the magazine except when specifically ordered. When so loaded or when supposed to be loaded, it is habitually carried locked; that is, with the safety lock turned to the "safe." At all other times it is carried unlocked with the trigger pulled. The cut-off is kept turned off except when cartridges are actually used.

(2) Whenever troops equipped with the rifle are formed under arms, pieces are immediately inspected at the commands: 1. *Inspection,* 2. *ARMS.*

A similar inspection is made before dismissal.

If cartridges are found in the chamber or magazine they are removed and placed in the belt.

(3) The bayonet is fixed only when so ordered.

(4) *Fall in* is executed with the rifle at the *Order arms.*

(5) Before starting any movement for troops armed with rifles, the command, 1. *Right shoulder,* 2. *ARMS,* is given before the command for movement.

Movements may be executed *At the trail* by prefacing the preparatory command with the words "at trail," as 1. *At trail, forward,* 2. *MARCH.* The trail is taken at the command *MARCH.*

(6) When the facings, alignments, open and close ranks, side step, back step, forming for shelter tents, extending and closing are executed from the order, the weapon is brought to the trail while in motion and the order resumed on halting. The position of *Trail arms* is taken at the command of execution in each case.

(7) At the command *Halt,* men armed with the rifle remain at the position of right (left) shoulder arms until the command: 1. *Order,* 2. *ARMS,* is given.

(8) In double time under arms, a disengaged hand is held as when without arms.

RULES GOVERNING EXECUTION OF THE MANUAL OF ARMS

(1) In all positions of the left hand at the balance, the thumb clasps the rifle; the sling is included in the grasp of the hand. In describing the manual of arms, the term "at the balance" refers to the center of the rear sight leaf.

(2) In all positions of the rifle, diagonally across the body, the barrel is up, but in front of the right hip, barrel crossing opposite the junction of the neck with the left shoulder. The rifle is grasped at the balance with the left hand, palm toward the body, wrist straight.

(3) The cadence of the motions is that of quick time. Recruits are first required to give their whole attention to the details of the motions, the cadence being gradually acquired as they become accustomed to handling their rifles. The instructor may require them to count aloud in cadence with the motions.

(4) The manual is not executed in marching except to pass from right shoulder to left shoulder or port arms and the reverse in marching at attention. These movements may be used to add interest to the drill or to prevent fatigue in long marches at attention.

The manual is taught at a halt and the movements may, for the purpose of instruction, be divided into motions and executed in detail. In this case, the command of execution determines the prompt execution of the first motion, and the commands *Two, Three, Four,* that of the other motions.

To execute the movement in detail, the instructor first cautions, *By the numbers.* All movements divided into motions are then executed as above explained until he cautions, *Without the numbers.*

(5) Any appropriate position of the manual of arms may be ordered from a previous position by giving the suitable commands.

Under exceptional conditions of weather and fatigue, the rifle may be carried as directed.

Position of order arms.—The butt of the rifle rests on the ground, barrel to the rear, toe of the butt on line with the toe of, and touching, the right shoe, right hand holding the rifle between the thumb and fingers, left hand as in position of attention without arms (Fig. 7-1).

Being at order arms.—1. *Trail,* 2. *ARMS.*

At the command *ARMS,* raise the rifle and incline the muzzle forward so that the barrel makes an angle of about 15 degrees with the vertical, the right arm slightly bent (Fig. 7-2).

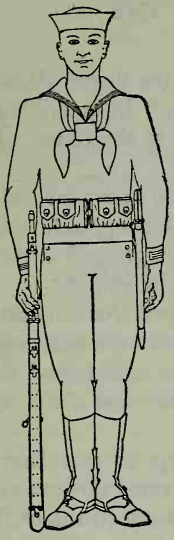


FIG. 7-1—Position of *Order Arms.*

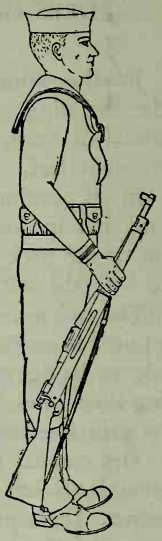


FIG. 7-2—Position of *Trail Arms.*

Being at trail arms.—1. *Order,* 2. *ARMS.*

At the command *ARMS,* lower the rifle with the right hand and resume the order.

Being at order arms to sling arms, and being at sling arms to unsling arms.—*(a) SLING ARMS.*

This movement is not executed in cadence and applies to any rifle, automatic rifle, light machine gun, light mortar, etc. Loosen the sling, if not already loosened, and in the most convenient manner assume the position shown in Fig. 7-3. This position is authorized for long parades, long reviews, and for occasions when the prolonged holding of the rifle becomes a hardship on the troops. When used in ceremonies the bayonet may be fixed.

(b) 1. *Unsling,* 2. *ARMS,* 3. *Adjust,* 4. *SLINGS.*

At the command *ARMS,* pieces are unslung. At the command *SLINGS,* slings are adjusted to the drill position. This adjustment of the sling will be made before precise movements of the manual are to be executed.

Being at order arms.—1. *Port,* 2. *ARMS.*

At the command *ARMS,* raise the rifle with the right hand and carry it diagonally across the front of the body until the right hand is in front of and slightly to the left of the chin, so that the barrel is up, butt in front of the right hip, barrel crossing opposite the junction of the neck

FIG. 7-3—Position of *Sling Arms.*

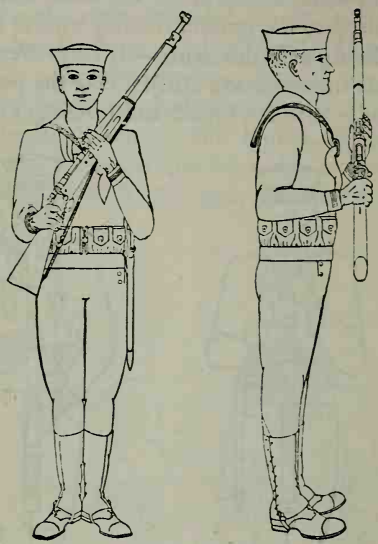


FIG. 7-4—Postion of *Port Arms.*

with the left shoulder. At the same time, grasp the rifle at the balance with the left hand, palm toward the body, wrist straight. *(TWO)* Carry the right hand to the small of the stock, grasping it, palm down, holding right forearm horizontal. (See Fig. 7-4.)

Being at order arms.—1. *Present,* 2. *ARMS.*

At the command *ARMS,* with the right hand carry the rifle in front of the center of the body, barrel to the rear and vertical, grasp it with the left hand at the balance, forearm horizontal and resting against the body. *(TWO)* Grasp the small of the stock with the right hand. (See Fig. 7-5.)

Being at present or port arms.—1. *Order,* 2. *ARMS.*

At the command *ARMS,* let go of the rifle with the right hand and regrasp the piece between the upper sling swivel and stacking swivel.

(See Fig. 7-6.) *(TWO)* Let go of the rifle with the left hand, lower the piece to the right so that the butt is 3 inches from the ground, barrel to the rear, left hand with the fingers extended and joined steadying the rifle, forearm and wrist straight and inclining downward. *(THREE)* Complete the order by lowering the rifle gently to the ground with the right hand. Cut away the left hand smartly to the side. Allowing the rifle to drop to the ground forcibly injures the rifle and is prohibited.

Being at order arms.—1. *Inspection,* 2. *ARMS.*

At the command *ARMS,* take the position of *Port arms.* Seize the bolt handle with the thumb and forefinger of the right hand, turn the handle

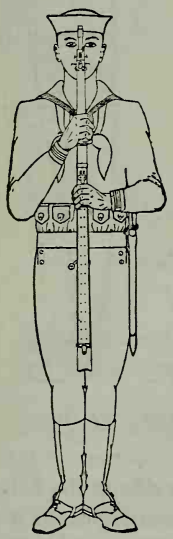
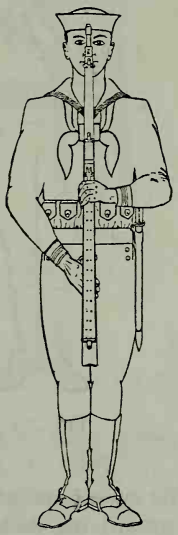


FIG. 7-5—Execution of *Present Arms.*



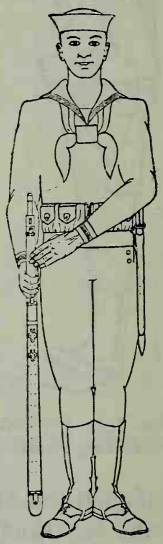


FIG. 7-6—Next to last position of *Order Arms.*

up, draw the bolt back, lower the head and eyes sufficiently to glance into the magazine. Having found the magazine empty, or having emptied it, raise the head and eyes to the front.

Being at inspection arms.—1. *Order (right shoulder, port),* 2. *ARMS.*

At the preparatory command, push the bolt forward, turn the handle down, pull the trigger, and resume *Port arms.* At the command *ARMS,* complete the movement ordered.

Being at order arms.—1. *Right shoulder,* 2. *ARMS.*

At the command *ARMS,* raise and carry the rifle diagonally across the body with the right hand as shown in Fig. 7-7, at the same time grasp it at the balance with the left hand. *(TWO)* Regrasp it with the right hand on the butt, the heel between the first two fingers, thumb and fingers closed on the stock. *(THREE)* Without changing the grasp of the right hand, place the rifle on the right shoulder, barrel up and inclined at an angle of about 45 degrees from the horizontal, trigger guard in the hollow of the shoulder, right elbow against the side, forearm horizontal, the rifle in a vertical plane perpendicular to the front; carry the left hand, thumb and fingers extended and joined, to the small of the stock, first joint of the forefinger touching the cocking piece, wrist straight, and elbow down. *(FOUR)* Cut away the left hand smartly to the side. (See Fig. 7-7.)

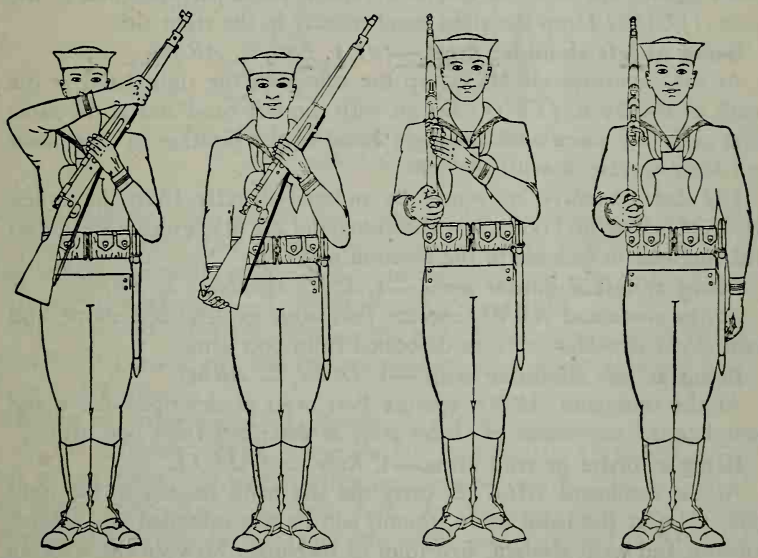


FIG. 7-7—Execution of *Right Shoulder Arms* in 4 movements.

Being at right shoulder arms.—1. *Port,* 2. *ARMS.*

At the command *ARMS,* press the butt down quickly and throw the rifle diagonally across the body, at the same time turning it to the left so as to bring the barrel up, the right hand retaining its grasp on

the butt, the left grasping the rifle at the balance. *(TWO)* Change the right hand to the small of the stock.

Being at right shoulder arms.—1. *Order,* 2. *ARMS.*

At the command *ARMS,* press the butt down quickly and throw the rifle diagonally across the body, the right hand retaining the grasp on the butt, the left hand grasping the rifle at the balance. Then execute *Order arms* as described from port arms.

Being at right shoulder arms.—1. *Left shoulder,* 2. *ARMS.*

At the command *ARMS,* execute *Port arms* in two counts. *(THREE)* Let go of the rifle with the left hand and with the right hand still grasping the small of the stock place it on the left shoulder, barrel up, trigger guard in the hollow of the shoulder; at the same time grasp the butt with the left hand, heel between the first and second fingers, thumb and fingers closed on the stock, left forearm horizontal, left elbow against the side, the rifle in a vertical plane perpendicular to the front. *(FOUR)* Drop the right hand quickly to the right side.

Being at left shoulder arms.—*(a)* 1. *Port,* 2. *ARMS.*

At the command *ARMS,* grasp the rifle with the right hand at the small of the stock. *(TWO)* Let go with the left hand and at the same time carry the piece with the right hand to the position of *Port arms* and then regrasp it with the left.

(b) Left shoulder arms may be ordered directly from the order, *Right shoulder,* or *Present.* At the command *ARMS,* execute *Port arms* and continue in cadence to the position ordered.

Being at left shoulder arms.—1. *Right shoulder,* 2. *ARMS.*

At the command *ARMS,* execute *Port arms* as described above, and then *Right shoulder arms,* as described from port arms.

Being at left shoulder arms.—1. *Order,* 2. *ARMS.*

At the command *ARMS,* execute *Port arms* as described above and complete the movement of *Order arms* as described from port arms.

Being at order or trail arms.—1. *Rifle,* 2. *SALUTE.*

At the command *SALUTE,* carry the left hand smartly to the right side, palm of the hand down, thumb and fingers extended and joined, forearm and wrist straight, first joint of forefinger between the stacking swivel and the muzzle as the conformation of the man permits, and look toward the person saluted. *(TWO)* Cut away the left hand smartly to the side; turn the head and eyes to the front.

Being at right shoulder arms.—1. *Rifle,* 2. *SALUTE.*

At the command *SALUTE,* carry the left hand smartly to small of the stock, forearm horizontal, palm of the hand down, thumb and

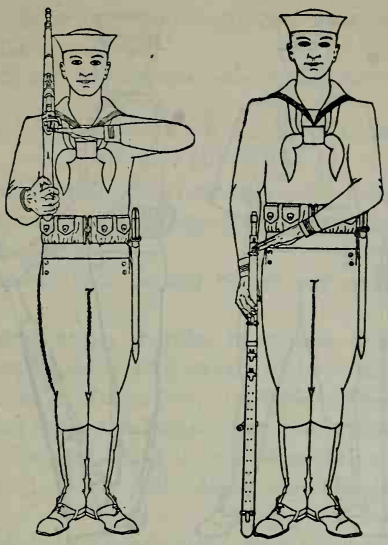


FIG. 7-8—Rifle salute at *Right Shoulder Arms* and at *Order Arms.*

fingers extended and joined, first joint of the forefinger touching end of cocking piece; look toward the person saluted. *(TWO)* Cut away the left hand smartly to the side; turn the head and eyes to the front.

Being at port arms.—1. *Right shoulder,* 2. *ARMS.*

At the command *ARMS,* change the right hand to the butt. *(TWO), (THREE)* Execute the last two movements as in *Right shoulder arms* from order arms.

Being at order arms.—1. *Parade,* 2. *REST.*

At the command *REST,* move the left foot smartly 12 inches to the left of the right foot, keeping the legs straight, so that the weight of the body rests equally on both feet. At the same time incline the muzzle of the rifle to the front, the right arm extended, right hand grasping the rifle just below the upper band. Hold the left hand behind the body, resting in the small of the back, palm to the rear. (See Fig. 7-9.)

Being at parade rest.—1. *Squad,* 2. *ATTENTION.*

At the command *ATTENTION,* resume the position of *Order arms.*

Being at order arms.—1. *Fix,* 2. *BAYONETS.*

At the command *BAYONETS*—

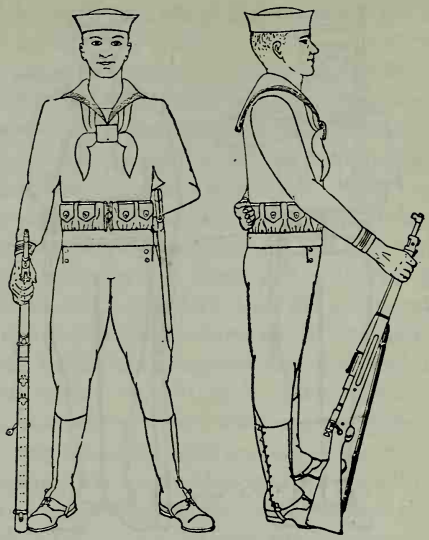


FIG. 7-9—Position of *Parade Rest*

(a) If the bayonet scabbard is carried on the belt, move the muzzle of the rifle to the left front and grasp the rifle below the stacking swivel with the left hand; grasp the bayonet with the right hand, back of the hand toward the body; pressing the spring with the forefinger, draw the bayonet from the scabbard and fix it on the barrel, glancing at the muzzle; resume the order.

(b) If the bayonet is carried on the haversack, draw and fix the bayonet in the most convenient manner.

(c) These movements are not executed in cadence.

Being at order arms.—1. *Unfix,* 2. *BAYONETS.*

At the command *BAYONETS*—

(a) If the bayonet scabbard is carried on the belt, take the position for fixing bayonets; grasp the handle of the bayonet with the right hand, pressing the spring, raise the bayonet until the handle is about 12 inches above the muzzle of the rifle; drop the point to the left, back of the hand toward the body and, glancing at the scabbard, return the bayonet, the blade passing between the left arm and the body; regrasp the rifle with the right hand and resume the order.

(b) If the bayonet scabbard is carried on the haversack, take the

bayonet from the rifle as described above and return it to the scabbard in the most convenient manner.

(c) These movements are not executed in cadence.

GENERAL RULES FOR LOADING AND FIRING THE RIFLE

(1) For ceremonial firing, the front rank only of units larger than a squad executes the loading and firing. A squad is always formed in line preliminary to such firing.

(2) Rifles are loaded and locked before any orders for firing are given.

(3) Except during firing, if rifles have been ordered loaded and locked, they are kept loaded and locked without command until the command *Unload,* or 1. *Inspection,* 2. *ARMS.* During firing, fresh clips will be inserted when the magazine or clip is exhausted.

To load.—*(a)* The unit being in any formation, standing at a halt, the commands are: 1. *With ball (blank, dummy, guard) cartridges,* 2. *LOAD.*

At the command *LOAD,* each front rank rifleman faces half right and carries the right foot 12 inches to the right and to such position as will insure the greatest firmness and steadiness of the body; raises or lowers the rifle and drops it into the left hand at the balance, left thumb extending along the stock, muzzle pointed into the air at an angle of 45 degrees, and turns the cut-off up. With the right hand he turns up the bolt and draws it back; takes a loaded clip and inserts the end in the clip slots; places his thumb on the powder space of the top cartridge, the fingers extending around the rifle and tips resting on the magazine floor plate; forces the cartridges into the magazine by pressing down with the thumb; removes the clip; thrusts the bolt home, turning down the handle; turns the safety lock to the "safe" and carries the hand to the small of the stock.

(b) For instruction in loading, the commands are: 1. *Simulate,* 2. *LOAD.*

At the command *LOAD,* execute loading as described above, except that the cut-off remains "off" and the handling of the cartridge is simulated.

To unload.—Begin in any formation, the command is: *UNLOAD.*

At the command *UNLOAD,* take the position of *LOAD,* turn the safety lock up, and move the bolt alternately backward and forward until all the cartridges are ejected. After the last cartridge is ejected, the

chamber is closed by first thrusting the bolt forward slightly to free it from the stud holding it in place when the chamber is opened, pressing the follower down and back to engage it under the bolt, and then thrusting the bolt home. The trigger is then pulled, the cartridges are picked up, cleaned, and returned to the belt, and the rifle is brought to the order.

To fire the rifle.—Being fully loaded with ball (blank or guard) ammunition, squeeze the trigger for each shot. After each shot draw back and thrust home the bolt with the right hand, leaving the safety lock turned up to the "ready."

To fire by volley.—*(a)* Being in firing formation with rifles loaded, the commands are: 1. *Front rank,* 2. *Ready,* 3. *AIM,* 4. *Squad,* 5. *FIRE.* (For ceremonial purposes, blank ammunition is used and only the front rank executes the commands.)

At the command *Ready,* take the position of *LOAD,* if not already in that position, and turn the safety lock to the "ready." At the command *AIM,* raise the rifle with both hands, butt placed and held firmly against the shoulder, left hand well under the rifle and grasping it at or in front of the balance, rifle resting in the palm of the left hand, right elbow at the height of the shoulder, right cheek held firmly against the stock as far forward as it can be placed without straining. The rifle is raised 45 degrees from the horizontal or, if ordered, at the horizontal. The left eye is closed, right eye looking through the notch of the rear sight. At the command *FIRE,* the trigger is squeezed rapidly; the rifle is then lowered to the position of *LOAD* and loaded.

(*b*) To continue the firing, the commands are: 1. *Aim,* 2. *Squad,* 3. *FIRE.*

Each command is executed as previously explained. *LOAD* (from the magazine) is executed by drawing back and thrusting home the bolt with the right hand, leaving the safety lock turned up to the "ready."

To cease firing.—The command is: *CEASE FIRING.*

At the command *CEASE FIRING,* firing stops; rifles not already at the position of *LOAD* are brought to that position.

CHAPTER 8

SCHOOL OF THE SQUAD

General rules 59

GENERAL RULES

(1) The squad is a group of men organized primarily as a combat team. It consists of one squad leader and other personnel as authorized by appropriate Tables of Organization. When the squad leader is absent, he is replaced by the second in command. If the second in command is also absent, the next senior member of the squad acts as leader. A squad has normally about 8 to 12 men.

(2) As far as practicable, the squad is kept intact. The normal formation of the squad is a single rank or single file. This permits variation in the number of men composing the squad.

(3) The squad in line marches to the left or to the front only for minor changes of position.

(4) The squad leader, when in ranks, is posted as the right man of the squad if in line or as the leading man if in column.

To form the squad.—*(a)* The command is: *FALL IN.*

At the command *FALL IN,* the squad forms in line. On falling in, each man except the one on the left extends his left arm laterally at shoulder height, palm of the hand down, fingers extended and joined. Each man, except the one on the right, turns his head and eyes to the right and places himself in line so that his right shoulder touches lightly the tips of the fingers of the man on his right. As soon as proper intervals have been obtained, each man drops his arm smartly to his side and turns his head to the front.

To form at close intervals.—*(b)* The commands are: 1. *At close interval,* 2. *FALL IN.*

At the command *FALL IN,* the men fall in as in *(a)* above, except that close intervals are obtained by placing the left hand on the hip, fingers extended downward and joined, thumb along the forefinger, heel of the hand resting against the hip bone near the belt, elbow in the plane of the body.

(c) The squad falls in on the right file if the squad leader is not in ranks.

(d) If the squad is formed under arms, pieces are inspected as prescribed in the previous chapter.

Previous instructions applicable.—The squad executes the positions, movements, and manual of arms as prescribed in the previous chapter, all men executing the movements simultaneously.

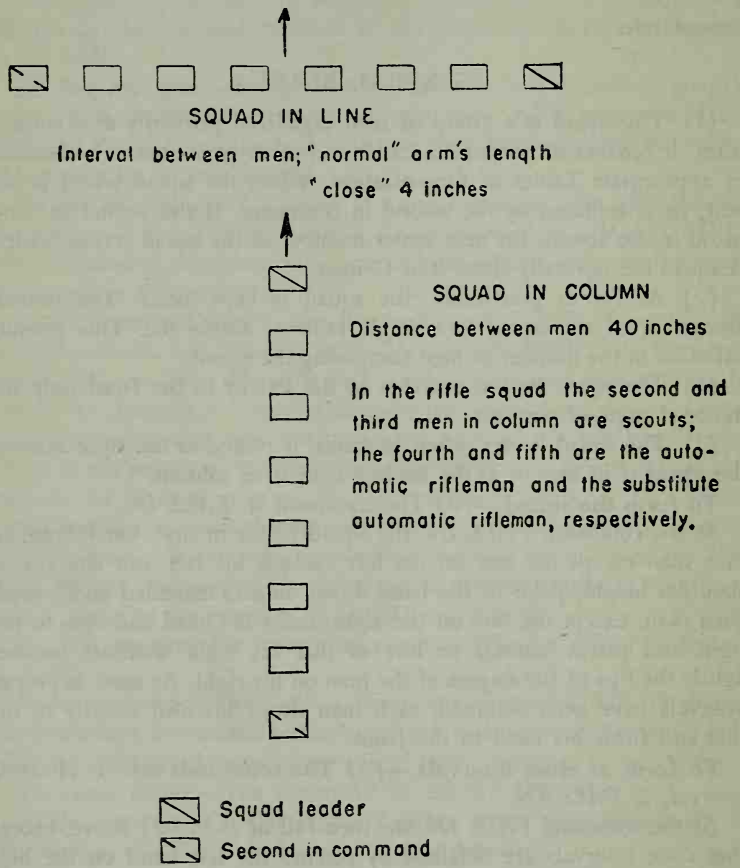


FIG. 8-1—The squad.

To dismiss the squad.—The commands are: 1. *Inspection,* 2. *ARMS,* 3. *Port,* 4. *ARMS,* 5. *DISMISSED.*

To count off.—*(a)* The command is: *COUNT OFF.*

At the command *COUNT OFF,* each man of the squad, except the one on the right flank, turns his head and eyes to the right. The right

flank man calls out, "One." Each man in succession calls out, "Two," "Three," etc., turning his head and eyes to the front as he gives his number.

(b) This command may be given whenever it is desired that the men know their relative position in the squad.

To align the squad.—*(a)* If in line, the commands are: 1. *Dress right (left),* 2. *DRESS,* 3. *Ready,* 4. *FRONT.*

At the command *DRESS,* each man, except the one on the left, extends his left arm (or if at close interval, places his left hand upon his hip), and all align themselves to the right. The instructor places himself on the right flank one pace from and in prolongation of the line and facing down the line. From this position he verifies the alignment of the men, ordering individual men to move forward or backward as is necessary. Having checked the alignment, he faces to the right in marching and moves three paces forward, halts, faces to the left, and commands: 1. *Ready,* 2. *FRONT.*

At the command *FRONT,* arms are dropped quietly and smartly to the side and heads turned to the front.

(b) If in column, the command is: *COVER.*

At the command *COVER,* men cover from front to rear with 40 inches distance between men.

Being in line at normal interval, to obtain close interval.—The commands are: 1. *Close,* 2. *MARCH.*

At the command *MARCH,* all men except the right flank man face to the right in marching and form at close interval (4 inches).

Being in line at close interval, to extend to normal interval.—The commands are: 1. *Extend,* 2. *MARCH.*

At the command *MARCH,* all men, except the right-flank man face to the left in marching and form at normal interval (arm's length).

Being in line, to march to the flank.—The commands are: 1. *Right (left),* 2. *FACE,* 3. *Forward,* 4. *MARCH.*

Movements are executed with all men stepping off simultaneously.

To march to the oblique.—*(a)* For the instruction of recruits, the squad being in column or correctly aligned, the instructor causes each man to face half right (left), points out his position, and explains that it is to be maintained in the oblique march.

(b) The squad being in any formation, the commands are: 1. *Right (left) oblique,* 2. *MARCH.*

At the command *MARCH,* given as the right foot strikes the ground, each individual advances and plants the left foot, faces half right in

marching and steps off in a direction of 45 degrees to the right of his original front. He preserves his relative position, keeping his shoulders parallel to those of the guide (man on right front of line or column), and so regulates his step that the ranks remain parallel to their original front.

(c) The command *HALT* is given on the left foot when halting from the right oblique and on the right foot when halting from left oblique.

At the command *HALT,* given as the left foot strikes the ground, each individual advances and plants the right foot, turns to the front on the ball of the right foot, and places the left foot by the side of the right foot.

(d) To resume the original direction, the commands are: 1. *Forward,* 2. *MARCH.*

At the command *MARCH,* each individual faces half left in marching and then moves straight to the front.

(e) If at *Half step* or *Mark time* while obliquing, the full step is resumed by the command: 1. *Oblique,* 2. *MARCH.*

(f) To give volume to the command the word "oblique" is pronounced to rhyme with "strike."

To march toward a flank while in march.—*(a)* The commands are: 1. *By the right (left) flank,* 2. *MARCH.*

At the command *MARCH,* each individual executes the movement as prescribed in Chapter 6.

(b) This movement is used when a quick movement to the right or left for a short distance is required. Normally the unit is halted, faced in the desired direction, and started forward again by the commands: 1. *Forward,* 2. *MARCH.*

Being in column, to change direction.—The commands are: 1. *Column right (left) (half right) (half left),* 2. *MARCH.*

At the command *MARCH,* the leading man executes the movement. The other men in the column execute the same movement successively and on the same ground as the leading man.

Being in line, to take interval and assemble.—*(a)* To take interval, the commands are: 1. *Take interval to the left (right),* 2. *MARCH.*

At the command *MARCH,* the right-flank man stands fast and extends his left arm at shoulder height, palm of the hand down, fingers extended and joined until the man on his left obtains the proper interval, then he drops his arm. Other men face to the left in marching and step out until they have an interval of two arms' length from the man on their right, then halt and face to the front. Each man, except

the one on the left who raises his right arm only, extends both arms laterally at shoulder height. Each man, except the right-flank man, then turns his head and eyes to the right and places himself in line so that the finger tips of his right hand touch lightly the finger tips of the left hand of the man on his right. As soon as each man aligns himself at two arms' length intervals from the man on his right, he drops his right arm to the side and turns his head and eyes to the front. He drops his left arm to the side when the man on his left has obtained his proper interval. If under arms, rifles will be slung prior to the execution of this movement.

(b) To assemble, the commands are: 1. *Assemble to the right (left),* 2. *MARCH.*

At the command *MARCH,* the right-flank man stands fast. All other men face to the right in marching and form at normal intervals.

To stack arms.—The squad being in line at normal or close interval, the commands are: 1. *Stack,* 2. *ARMS.* The second man from the right and the second man from the left of the squad make the stacks. If there are less than six men in the squad, only one stack is made, the second man from the right making it. If there are more than eight men in the squad, three stacks will be made, the center or right-center man making the center stack.

The stack is made as follows: At the command *ARMS,* the man on the left of the stackman regrasps his rifle with the right hand at the balance, carrying it to the horizontal position, barrel up, and passes his rifle to the stackman, who grasps it with his left hand between the upper-sling swivel and stacking swivel and places the butt between his feet, barrel to the front, muzzle inclined slightly to the front, the thumb and forefinger raising the stacking swivel. The stackman then throws the butt of his own rifle two feet in advance of that of his left file and 6 inches to the right of his own right toe; at the same time he allows his right hand to slip to the stacking swivel and engages his rifle with that of his left file. The man on the right of the stackman raises his rifle with his right hand, regrasps it with his right hand at the balance, steps to the left front, keeping his right foot in place, and carries his rifle well forward, barrel to the front; the left hand guiding the stacking swivel engages the lower hook of the swivel of his own rifle with the free hook of that of his left file, and then turns the barrel outward into the angle formed by the other two rifles, and lowers the butt to the ground so that it will form a uniform stack with the other two rifles. He then assumes the position of attention. Other rifles of the

squad are passed toward the nearest stack and laid on the stack by the stackman.

To take arms.—The squad being in line behind the stacks, the commands are: 1. *Take,* 2. *ARMS.*

At the command *ARMS,* the procedure of stacking arms is reversed. The loose rifles are first passed back. In breaking the stack, the stackman grasps his rifle and that of the man on his left, so that the rifles will not fall when the man on the right raises and disengages his rifle. Each man, as he receives his rifle, resumes the position of order arms.

Column of twos.—When marching small groups, not at drill, the group may be marched in column of twos by forming it in two ranks and giving the command: 1. *Right (left),* 2. *FACE.*

To form column of twos from single file and reform.—*(a)* The squad being in column, at a halt, to form column of twos, the commands are: 1. *Form column of twos,* 2. *MARCH.*

At the command *MARCH,* the leading man stands fast; the second man in the squad moves by the oblique until he is to the left of and abreast of the squad leader with normal interval, and halts; the third man moves forward until behind the squad leader with normal distance and halts; the fourth man moves by the oblique until he is to the left of and abreast of the third man with normal interval, and halts; and so on.

(b) The squad being in column of twos, in marching, to re-form single file, the squad is first halted. The commands are: 1. *Form single file from the right,* 2. *MARCH.*

At the command *MARCH,* the leading man of the right column moves forward, the leading man of the left column steps off to the right oblique, then executes left oblique so as to follow the right file at normal distance. Remaining twos follow successively in like manner.

CHAPTER 9

SCHOOL OF THE PLATOON

Composition, formation, and marching 65
Company drill 70

Composition and formation of the platoon.—The platoon consists of platoon headquarters and several squads. Platoon headquarters consists of a platoon leader and one or more assistants. For purposes of drill and ceremonies, a three-squad or four-squad formation should be arranged and the size of the squads equalized. Figure 9-1 shows how the platoon formation applies to a rifle platoon.

Formations of more than one squad.—*(a)* The squads form in line, one behind the other, with 40 inches distance between ranks.

(b) Squads are usually arranged to produce a three- or four-rank formation so that by facing to the right the unit will march in column of threes or column of fours depending on the number of squads.

(c) A two-squad unit forms in two ranks and marches in column of twos.

(d) A three-squad unit forms in three ranks and marches in column of threes.

(e) A four-squad unit forms in four ranks and marches in column of fours.

(f) A platoon composed of two sections of two squads each forms in four ranks and marches in column of fours.

(g) Movements are described herein for column of threes or fours and may be executed by either formation.

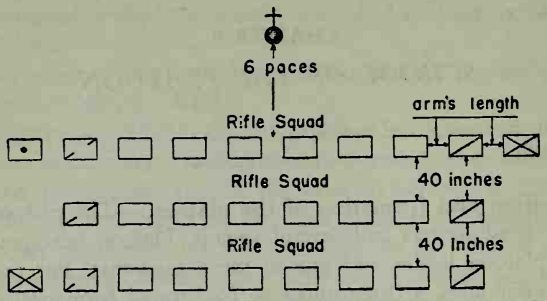
To form the platoon.—*(a)* The command is: *FALL IN.*

At the command *FALL IN,* the first squad forms in line, its center opposite and three paces from the platoon petty officer. The other squads form in rear of the first squad and in the same manner, with 40 inches distance between ranks. Members of the rear squads extend their arms to obtain their approximate intervals but cover the corresponding members in the first squad. The guide places himself as shown in Fig. 9-1.

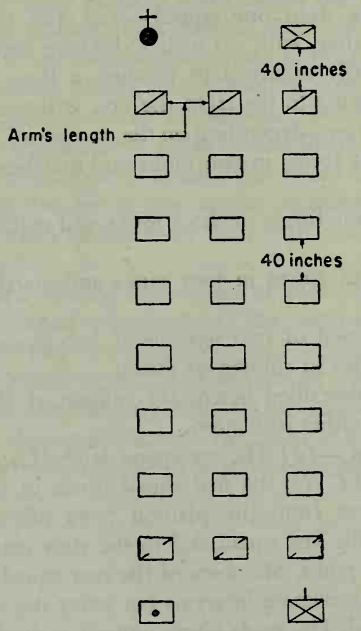
(b) To form with close intervals, the commands are: 1. *At close interval,* 2. *FALL IN.*

At the command *FALL IN,* the movement is executed as prescribed in *(a)* above except that squads form at close interval.

(c) The platoon is ordinarily formed and dismissed by the platoon petty officer.



RIFLE PLATOON IN LINE



RIFLE PLATOON IN COLUMN

Platoon leader
Second in command
Platoon guide
Squad leader
Second in command of squad
Messengers, etc.

FIG. 9-1—Platoon formations.

To march the platoon.—*(a)* The normal formation for marching is in column of threes (or fours) with squad columns abreast, squad leaders at the head of their squads.

(b) The platoon in line marches to the left or to the front only for minor changes of position.

(c) The platoon being in line, to march to the right the commands are: 1. *Right,* 2. *FACE,* 3. *Forward,* 4. *MARCH.* This marches the platoon in column of threes (or fours) to the right.

Guide in marching.—Except when otherwise directed, men in ranks keep the proper distance and interval and align themselves on the men toward the flank on which the guide is marching. When it is desired to guide toward the left, the command is: *GUIDE LEFT.* The guide and the platoon leader then change their relative positions.

Being in column of threes (or fours) at normal interval between squads, to march (or form) at close interval.—*(a)* The commands are: 1. *Close,* 2. *MARCH.*

At the command *MARCH,* the squads close to the center by obliquing until the interval between men is 4 inches. The center squad (or squads) takes up the half step until the dress has been regained. The distance, 40 inches, remains unchanged.

(b) If this movement is executed from the halt, the squads close toward the center by executing right or left step until 4-inch intervals are reached. If in column of threes, the first and third squads left and right step two steps. If in column of fours, the second and third squads left and right step one step, the first and fourth squads left and right step three steps.

Being in column of threes (or fours) at close interval between squads, to march (or form) at normal interval.—*(a)* The commands are: 1. *Extend,* 2. *MARCH.*

At the command *MARCH,* the squads open to the right and left from the center by obliquing until the interval between men is one arm's length. The center squad (or squads) will take up the half step until the dress has been regained.

(b) If this movement is executed at the halt, the squads execute right or left step until they have secured the proper interval.

Being in column of threes (or fours), to change direction.—The commands are: 1. *Column right (left),* 2. *MARCH.*

At the command *MARCH,* given as the right foot strikes the ground, the right flank man of the leading rank faces to the right in marching, and takes up the half step until the other men of his rank are abreast

of him, then he resumes the full step. The other men of the leading rank oblique to the right in marching without changing interval, place themselves abreast of the pivot man and conform to his step. The ranks in rear of the leading rank execute the movement on the same ground, and in the same manner, as the leading rank.

Being in column of threes (or fours), to form line to the front.—The commands are: 1. *Column right,* 2. *MARCH,* 3. *Platoon,* 4. *HALT,* 5. *Left,* 6. *FACE.* The command *HALT* is given after the change of direction is completed.

Being in any formation in march, to march toward a flank.—The commands are: 1. *By the right (left) flank,* 2. *MARCH.*

This movement is executed as prescribed for the squad. If the platoon is in column at close (4-inch) intervals, the squads in rear of the squad which becomes the leading squad take up the half step until they each reach 40 inches distance from the squad ahead. This movement is used only for short distances.

Being in line, to open and close ranks.—*(a)* To open ranks the commands are: 1. *Open ranks,* 2. *MARCH,* 3. *Ready,* 4. *FRONT.*

At the command *MARCH,* the front rank takes three steps forward, halts, and executes *Dress right.* The second rank takes two steps forward, halts, and executes *Dress right.* The third rank takes one step forward, halts, and executes *Dress right.* The fourth rank, if any, executes *Dress right.* The platoon leader places himself on the flank of the platoon toward which the dress is to be made, one pace from and in prolongation of the front rank and facing down the line. From this position he aligns the front rank. The second and third ranks are aligned in the same manner. In moving from one rank to another, the platoon leader faces to the left in marching. After verifying the alignment of the rear rank, he faces to the right in marching, moves three paces beyond the front rank, halts, faces to the left, and commands: 1. *Ready,* 2. *FRONT.*

(b) To close ranks, the commands are: 1. *Close ranks,* 2. *MARCH.*

At the command *MARCH,* the front rank stands fast; the second rank takes one step forward and halts; the third rank takes two steps forward and halts; and the fourth rank, if any, takes three steps forward and halts. Each man covers his file leader.

Stack arms.—Before stacking arms ranks are opened. Arms are then stacked by each squad.

To form column of twos and single file and re-form.—The platoon may be marched in column of twos or single file by the procedure given

below. This is not a precise movement. It is practiced in drill so that when necessary the movement may be executed smoothly and without delay. The change of column is always made from a halt.

(a) (1) The platoon being in column of threes, at a halt, to form column of twos, the commands are: 1. *Column of twos from the right (left),* 2. *MARCH.*

At the command *MARCH,* the two right squads march forward; the left squad forms column of twos as prescribed for the squad and then executes *Column half right* and *Column half left* so as to follow in column the leading squads. Forty-inch distances are maintained.

(2) The platoon being in column of twos, at a halt, to re-form in column of threes, the commands are: 1. *Column of threes to the left (right),* 2. *MARCH.*

At the command *MARCH,* the two leading squads stand fast. The rear squad forms single file from the right and moves to its normal place beside the leading squads by executing *Column half left* then *Column half right.* It is halted when its leading file is on line with the leading rank of the platoon.

(b) (1) The platoon being in column of fours, at a halt, to form column of twos, the commands are: 1. *Column of twos from the right (left),* 2. *MARCH.*

At the command *MARCH,* the two right squads march forward; the two left squads initially stand fast, then follow the two leading squads by executing *Column half right* and *Column half left.* Forty-inch distances are maintained.

(2) The platoon being in column of twos, at a halt, to re-form in column of fours, the commands are: 1. *Column of fours to the left (right),* 2. *MARCH.*

At the command *MARCH,* the two leading squads stand fast. The two rear squads move to their normal places by executing *Column half left* then *Column half right* and are halted when the leading files are on line with the leading rank of the platoon.

(c) (1) The platoon being in column of threes (or fours), at a halt, to form single file, the commands are: 1. *Column of files from the right (left),* 2. *MARCH.*

At the command *MARCH,* the right squad of the platoon moves forward. The other squads stand fast initially and then successively follow the leading squad by executing *Column half right* and *Column half left.* Distances of 40 inches are maintained.

(2) The platoon being in single file, at a halt, to re-form in column

of threes (or fours), the commands are: 1. *Column of threes (or fours) to the left (right),* 2. *MARCH.*

At the command *MARCH,* the leading squad stands fast. The other squads move to their normal places by executing *Column half left,* then, at the proper time, column half right and are halted when the leading file is on line with the leading rank of the platoon.

(d) Whenever commands are given involving movements of squads in which one squad stands fast, takes up the march, continues the march, or changes formation, the squad leader gives the appropriate commands.

COMPANY DRILL

General information on company drill, and figures showing simple formations, are given below.

Rules for company drill.—*(a)* The platoon, rather than the company, is the basic close-order drill unit. Only such formations are prescribed for the company as are necessary for marches, drills, and ceremonies.

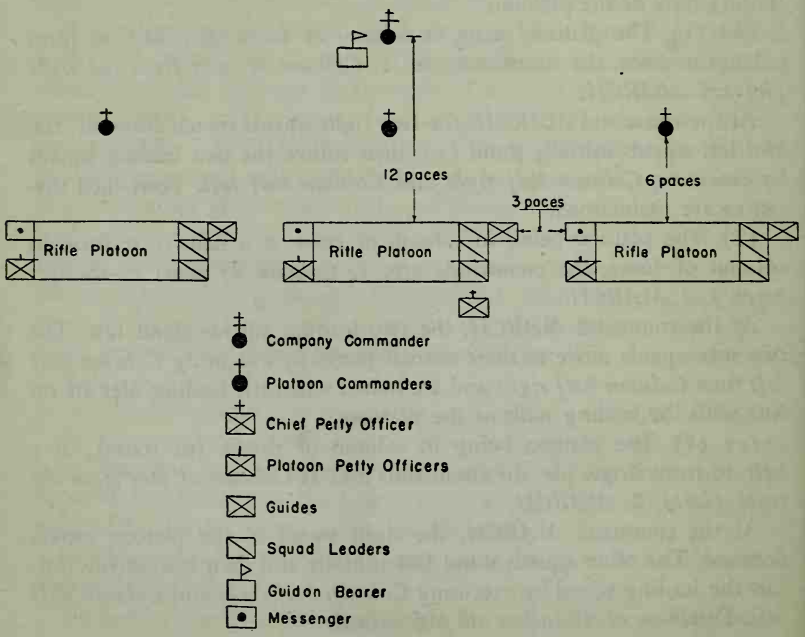


FIG. 9-2.

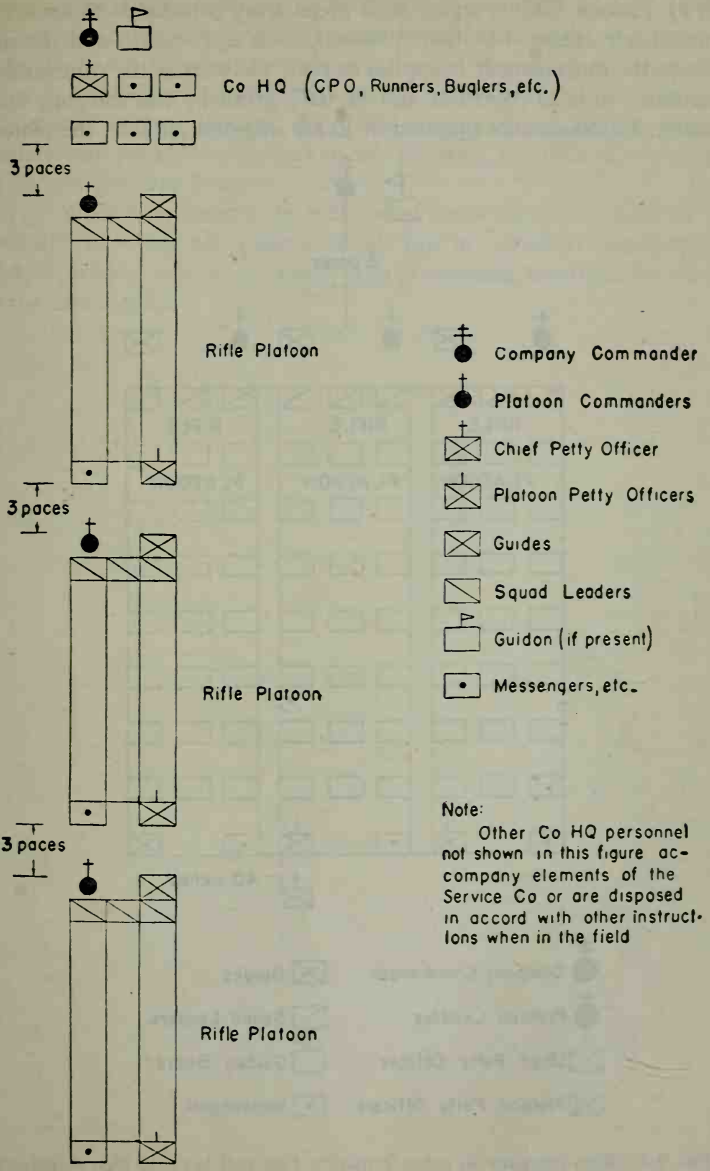


FIG. 9-3—Rifle company in march formation.

(b) Platoon leaders repeat such preparatory commands as are to be immediately executed by their platoons, such as *Forward,* and the men execute the movement if it applies to their platoons at the command of execution, such as *MARCH* and *HALT,* given by the company commander. In movements executed in *Route step* and *At ease,* the platoon

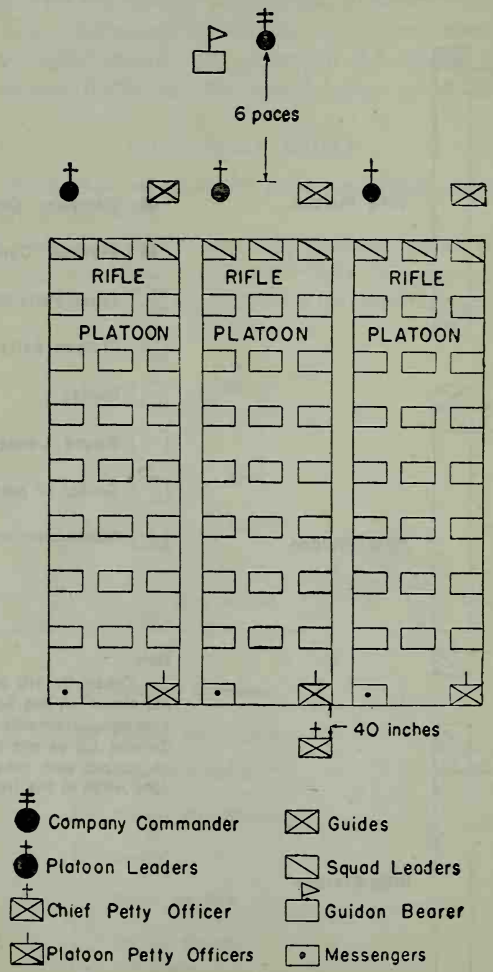


FIG. 9-4—Rifle company in mass formation (interval between men 4 inches; distance between men 40 inches).

leaders repeat the command of execution if necessary. Platoon leaders do not repeat the company commander's commands in having the company *Fall out, Stack arms, Take arms,* or in executing the manual of arms, nor those commands which are not essential to the execution of a movement by their platoons. In giving commands or cautions, platoon leaders may prefix the numbers of the platoons, as: *First platoon, halt;* or *Second platoon, forward.*

(c) Whenever commands are given involving movements of the company in which one platoon stands fast or continues the march, its platoon leader commands: *Stand fast,* or cautions, *Continue the march,* as the case may be.

CHAPTER 10

BOATS UNDER OARS

Tables of commands 74
Explanation of commands 75

TABLES OF COMMANDS

Commands

The commands in Table I shall be used by cutters with sunken rowlocks to shove off and go alongside, when acting as regular running boats, or when making special trips with officers in port.

Table I

(1) *Stand by the oars.*
(2) *Up oars.* } 1 and 2 *given before boat is reported ready.*
(3) *Shove off.*
(4) *Let fall.*
(5) *Give way together.*
(6) *In bows.*
(7) *Stand by to toss, Toss,* or *Oars* (followed by *Boat the oars* or *Way enough,* without the command *Oars*).

In all other cases the commands in Table II shall be used to shove off and go alongside. Boats with swivel rowlocks will not toss oars, and boats with awnings spread cannot toss oars.

Table II

(1) *Stand by the oars.*
(2) *Shove off.*
(3) *Out oars.*
(4) *Give way together.*
(5) *In bows,* or *trail bow.*
(6) *Oars* (followed by *Boat the oars* or *Way enough,* without the command *Oars*).

The special commands in Table III are for use in the cases indicated.

Table III

Out oars.—To rig out the oars in the rowlocks ready for pulling.

Oars.—(1) To salute. (2) To stop pulling for any purpose, keeping the oars out horizontal and blades feathered.

Give way together (starboard, port).—To commence pulling.

Trail.—(1) To salute. (2) To pass obstructions. For the latter, oars of either side may be trailed independently.

Hold water.—To check headway or sternway. The oars of either side may hold water independently. If boat has much headway, care is required.

Stern all.—To acquire sternway. Should not be given when boat has much headway. When boat has headway, should be preceded by *Hold water.*

Back starboard (port).—To turn. Should *Hold water* before backing, if boat has much headway.

Back starboard, give way port (or vice versa).—To turn quickly when boat has little or no headway.

Stand by to toss. Toss.—Used only in cutter, with sunken rowlocks. (1) To salute. (2) In going alongside, when it is not desirable to boat the oars. The habitual command to be used when coming alongside. (See Fig. 10-4.) Given from position of *Oars.*

Boat the oars.—To get the oars into the boat. Given when lying on oars, or when oars have been tossed or trailed.

Point the oars.—To shove off a grounded or beached boat.

Way enough.—To cease pulling and boat the oars. Given only while pulling, and for proper execution must be given just as the blades enter the water.

Let fall.—To go from *Up oars* to *Oars.*

Note.—Thwarts and oars are numbered from forward. Double-banked thwarts are designated by No. 1, starboard, No. 1, port; No. 2, starboard, No. 2, port: etc. The thwarts next to the bow and stroke are also properly designated as second bow and second stroke.

EXPLANATION OF COMMANDS

Dress or Special Service with Cutters Requires Use of Commands in Table I

The oars will be brought up to the position of *Up oars* before the boat is reported ready; the bowmen stand in the foresheets, holding on to the grab rope or jackstay, the inboard stroke oar in stern sheets holds on with boat hook. The oars are brought to the position of *Up oars* by the commands:

(a) Stand by the oars.—Every man except the bowman seizes his oar by its handle and sees the blade clear of other oars. The oars should be shoved forward over the gunwale far enough to bring the handle in the proper position, but should be kept fore and aft. The blades will be kept clear of the bowmen's boat hooks. If awnings are spread the most convenient thwartmen cast off the stops. (See Fig. 10-6.)

(b) Up oars.—The oars, except the two bow and the inboard stroke oars, are tossed quickly to a vertical position, blades trimmed in a fore-and-aft plane and in line with that of the stroke oar, handles of oars resting on bottom boards, outboard hand grasping loom of oar at height of chin, wrist of inboard arm resting on inboard thigh and steadying oar. The boat officer or coxswain then reports to the officer of the deck that his boat is alongside, ready for duty. When the officer of the deck has given necessary orders to the boat, the boat officer or coxswain commands:

(a) Shove off.—This command is executed as described on p. 79. As soon as possible the inboard stroke oar lays aside his boat hook and gets up his oar without further command. If time permits, the bowmen get up their oars and await the command *Let fall.* If, however, the command *Let fall* is given before their oars are up, they point their oars forward over the gunwale, "kiss" the blades, swing them out, and

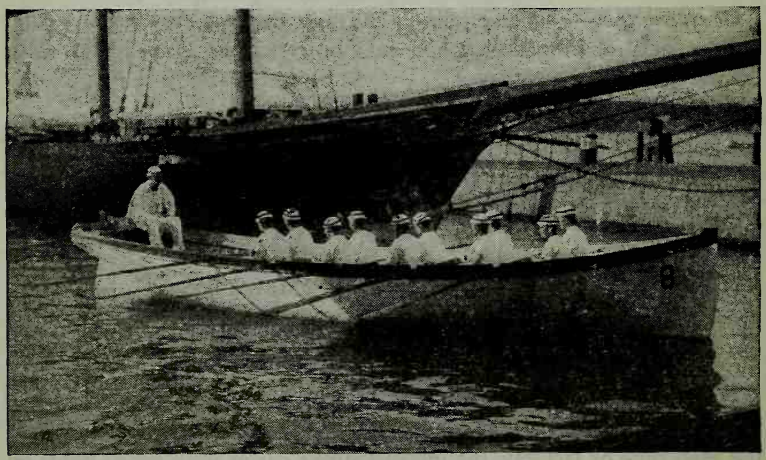


FIG. 10-1—Cutter. Position, *Oars.*

take up the stroke, or come to *Oars,* as the case may be. (See Fig. 10-1.)

(b) Let fall.—Given when the boat is clear of the ship's side. It may be necessary to let fall the forward oars before there is room for the after oars to clear the ship's side. This would be done by the command *1, 2, and 3, Let fall,* or *2 and 3, Let fall.* Other oars remain vertical until the command *Let fall.* At this command, all the oarsmen raise their oars vertically and drop the blades outboard into the rowlocks smartly and together, slipping the inboard hand to the handle of the oar, and come to position *Oars* with both hands on the handles. Under no circumstances should the blades be allowed to touch the water in letting fall.

(c) Give way together.—All the oarsmen take the full stroke, keeping accurate stroke with the starboard stroke oar. Feather blades habitually. Bowmen get out their oars together and take up the stroke. (They may have got them out before the command *Give way together,* in which case they give way with the other members of the crew.) The crew will continue to pull a strong, steady stroke, always using their backs, and maintain silence.

(d) In bows.—Given as landing is approached, and while the blades are in the water. Bowmen complete that stroke, toss oars simultaneously to an angle of 45 degrees, and boat them together, seize boat hooks, stand erect in bow, facing forward, holding boat hooks vertical in front of them until needed.

(e) Stand by to toss. Toss.—The cautionary command is given as a warning to the crew. The command *Toss* is given as the blades enter the water at the beginning of the stroke, and when the boat has sufficient headway just to reach the gangway or landing. The oarsmen complete that stroke and then toss the oars quickly to a vertical position by pressing smartly on the handle with inboard hand, raising the oar with the outboard hand under the loom. Lower handle to bottom board and assume position described at *Up oars.* The inboard stroke oar lays his oar in the boat quickly after he has it at the vertical position, seizes boat hook and assists to check headway and haul stern of boat into the gangway.

(f) The crew remains at the *Toss* until officers leave the boat. The oarsmen are then in position to *Let fall,* when the boat is ordered to lie off the quarter or to haul out to the boom.

If it is desirable to lay the oars in the boat, it will be done by the

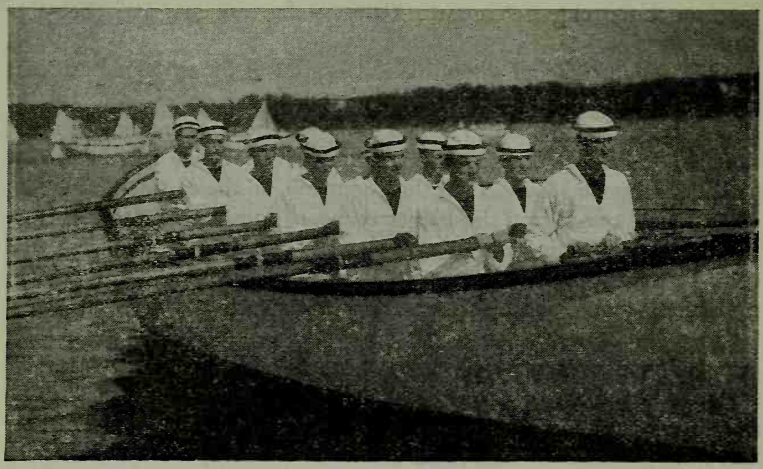


FIG. 10-2—Whaleboat. Position, *Oars*.

command *Boat the oars,* at which each man lays his oar quickly and quietly in the boat, blades forward.

In rough weather or at night (when it is not desired to remain alongside with the oars at *Toss*), the command *Oars* followed by

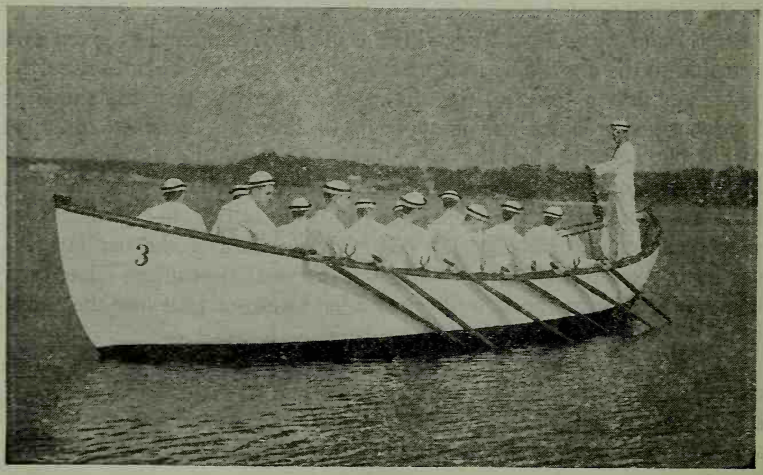


FIG. 10-3—Whaleboat. Position, *Trail*.

Boat the oars or the command *Way enough* given alone may be used as described under *(g)*, p. 83, except in *Way enough* oars are tossed to an angle of 45 degrees before being boated. (See Fig. 10-8.)

Explanations of the Commands in Table II

Ordinary ship's service permits the use of the commands listed in Table II and described below.

Suppose a whaleboat (double banked) manned at the gangway, bowmen standing in foresheets holding on with boat hook to grab ropes or

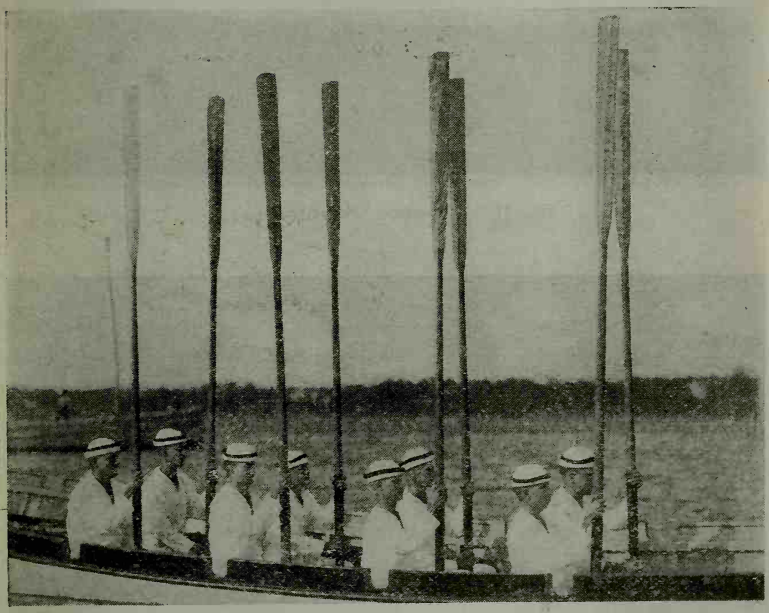


FIG. 10-4—Cutter. Position, *Toss*.

jackstay, oars boated. The coxswain has order to shove off and go in for a working party. The coxswain commands and the crew executes the details as follows:

(a) Stand by the oars.—The same as under Table I.

(b) Shove off.—Bowmen shove bow smartly away from ship's side with boat hooks, at the same time shoving the boat a little ahead, if possible; the coxswain sheers her off with tiller and hauls ahead on stanchions of the gangway or on the grab rope, assisted as necessary by

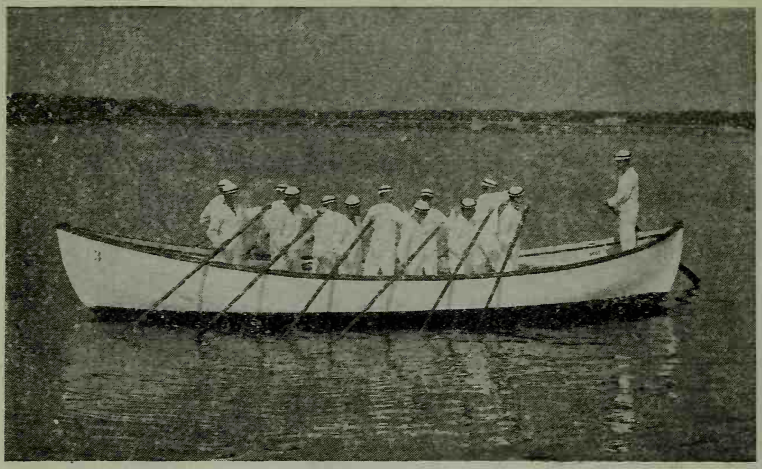


FIG. 10-5—Position, *Point the oars.*

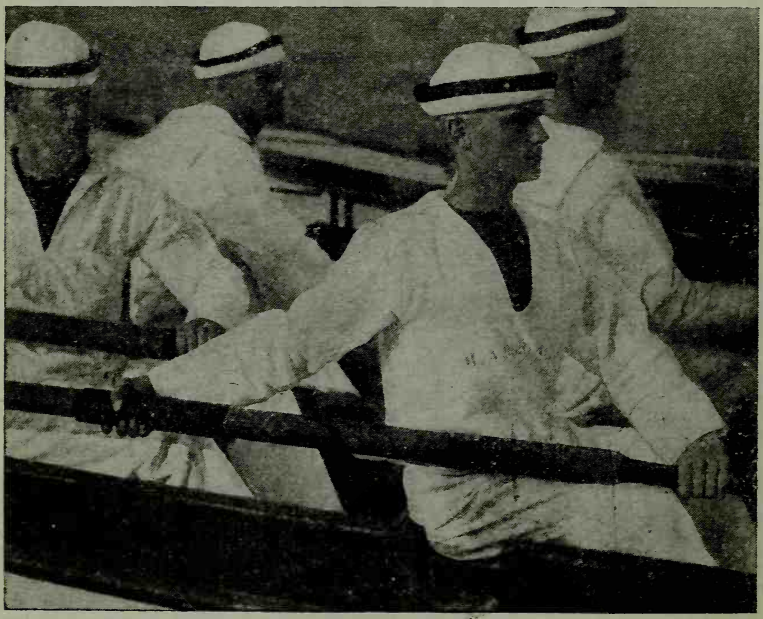


FIG. 10-6—Position, *Stand by the oars.*

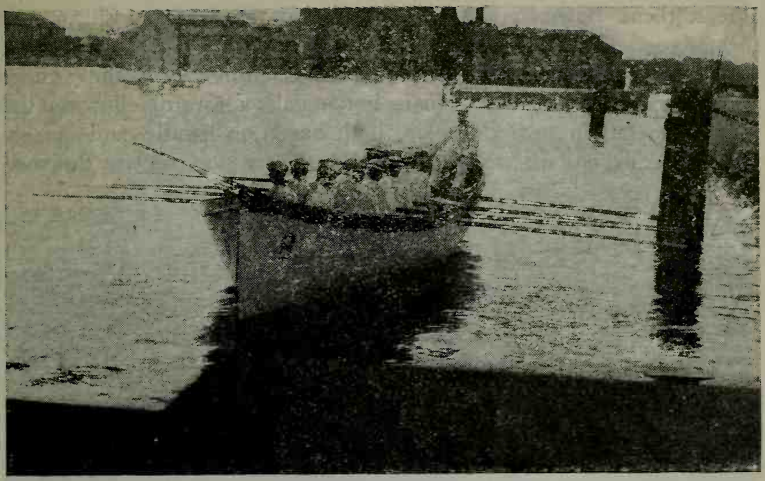


FIG. 10-7—Position, *Out oars*. Bowmen ready to *Out oars*.

the inboard stroke oar, who takes his seat as soon as possible and prepares to get his oar out with rest of crew. Fenders are rigged in by men

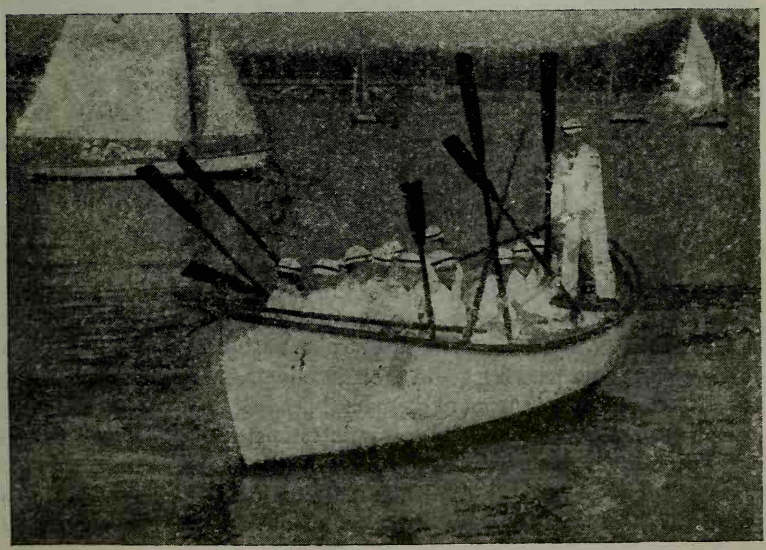


FIG. 10-8—Position, *Way enough*. Crew boating oars.

abreast them. Bowmen place boat hooks fore and aft midships, seat themselves, and get their oars ready.

(c) Out oars.—Given when the boat is clear of the ship's side. Thwartmen throw blades of oars horizontally outward, allowing the leathers to fall in rowlocks, place both hands on handle, and quickly trim blades flat and directly abeam. This is the position of *Oars*. Bowmen

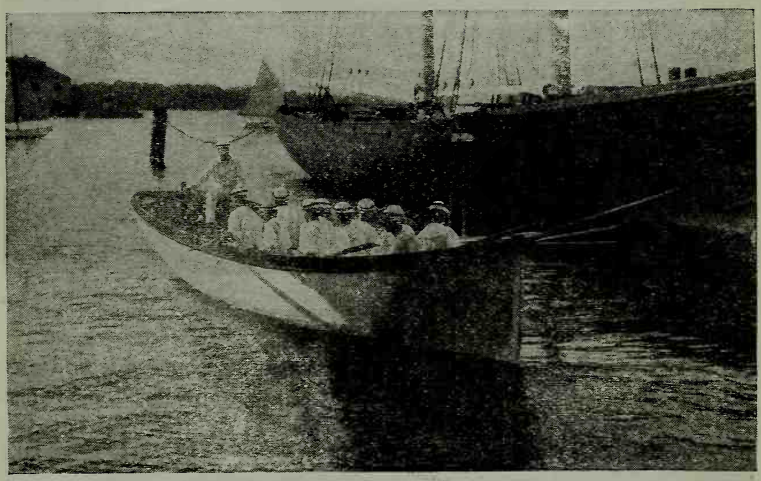


FIG. 10-9—Position, *Boating oars*. Stroke oar outboard.

throw their oars at the same time as rest of crew, if they are ready; otherwise they swing their oars out together, touching their blades forward to insure making the movements in unison, and bring them to the position of *Oars* or take up the stroke with the remainder of the crew as the case may be. (See Fig. 10-7.)

(d) Give way together.—Same as *(c)*, p. 77.

In bows.—Given as landing is approached, and while the blades are in the water. Bowmen complete that stroke, unship oars, and boat them together, seize boat hooks, stand erect in bow, facing forward, holding boat hooks vertically in front of them until needed.

(f) Oars.—Given when the coxswain estimates that the boat's headway will carry her to the landing, and while the blades are in the water. Finish that stroke and assume the position of *Oars*. When in this position, if landing of gangway is clear of other boats, command *Boat*

the oars. The crew unship their oars simultaneously with as little noise as possible, rigging the blades entirely inside the gunwale. The stroke oarsman next to the landing gangway takes up a boat hook, the men nearest the fenders place them over on inboard side, bowmen and stroke oarsmen check headway, keep boat clear, haul alongside, etc., as necessary. (See Fig. 10-9.)

(g) If preferable and the skill of the crew will enable them to perform the movement together, the command *Oars* may be omitted, and the command *Way enough* may be given instead when the boat's headway will carry her to the landing and while the blades are in the water at the beginning of a stroke. (See Fig. 10-8.) The oarsmen finish that stroke and, as the oars leave the water, they unship them and boat them quickly and quietly, rigging the blades entirely inside of the gunwale. The stroke oarsman next to the gangway or landing takes up his boat hook; men nearest the fenders place them over the inboard side; bowmen and stroke oarsmen check headway, keep boat clear, haul alongside, etc., as necessary.

Note.—With a single-banked boat, the order *Trail* could be given in place of the orders *Oars* or *Way enough*. The oarsmen simply let go the handles, allowing the oars to trail in a fore-and-aft direction. The oars in this case are not boated until the command *Boat the oars,* when the oars are lifted into the boat with the blades aft.

Explanations of Commands in Table III

(a) Trail.—Given when blades are in the water. Finish that stroke, release the handle of the oar, allowing it to draw fore and aft and trail alongside. If no trailing lines are fitted, retain the handle of the oar in the hand. With a cutter having sunken rowlocks, lift the handle of the oar quickly when blade is in the water at middle of stroke, throw oar out of rowlock, and retain handle in hand.

(b) Hold water.—Drop the blades in the water, and hold them perpendicular to the keel line, blades vertical. With considerable way on, especially in a laden boat, care in holding water is required to prevent carrying away the rowlock or gunwale or the oar itself. Under these conditions, drop the oars in the water with the upper edges of the blades inclined forward and gradually bring the blades vertical as way is lost.

(c) Stern all.—Given from positions of *Oars* or *Hold water*. The oars are backed, keeping stroke and feathering as when pulling ahead.

(d) Back starboard (port).—Designated oars are backed as at *Stern*

all. Generally, when boats have way on, oars should not be backed until the headway is checked by holding water or laying on oars.

(e) Back starboard, give way port (or vice versa).—Given from the position of *Oars* or *Hold water.* Proceed as under par. *(b),* p. 83.

(f) Point the oars.—To shove off a boat that has grounded, stand facing aft, point the blades of the oars forward and downward to the beach at an angle of about 30 degrees, ready to shove off at the command. If waves lift the stern of the boat, the united effort to shove off should be made just as her stern lifts.

When for any reason it may be desirable, the preparatory command *Stand by to*—— may precede the commands *Toss, Trail, Hold water, Stern all,* or in fact any command of execution given in a boat. In order to secure precision and uniformity of movement and to avoid taking the crew by surprise, cautionary orders should usually precede commands of execution, the crew thus being always prepared promptly to execute the commands when given; they should only be used when necessary, since a multiplicity of cautionary or preparatory orders detracts from the sharp, smart work that boats and their cews should exhibit.

Note.—The preparatory command for *Oars* is *Stand by to lay on the oars.*

CHAPTER 11

TO PULL AN OAR: NOMENCLATURE

Positions 85
Nomenclature 87
Notes on handling boats under oars 92

POSITIONS

EVERY sailor should know how to pull an oar properly. For purposes of explanation, the movements of a complete stroke will be divided into five positions. A study and practice of these positions will enable everyone to learn our Navy's standard stroke in a short time.

Position No. 1.—This is the position of *Oars*. (See Fig. 10-2.) The man sits erect, eyes directly astern, oar horizontal and blade flat. Note the position of the hands on the handle of the oar. The wrists are down in order to get the blade flat.

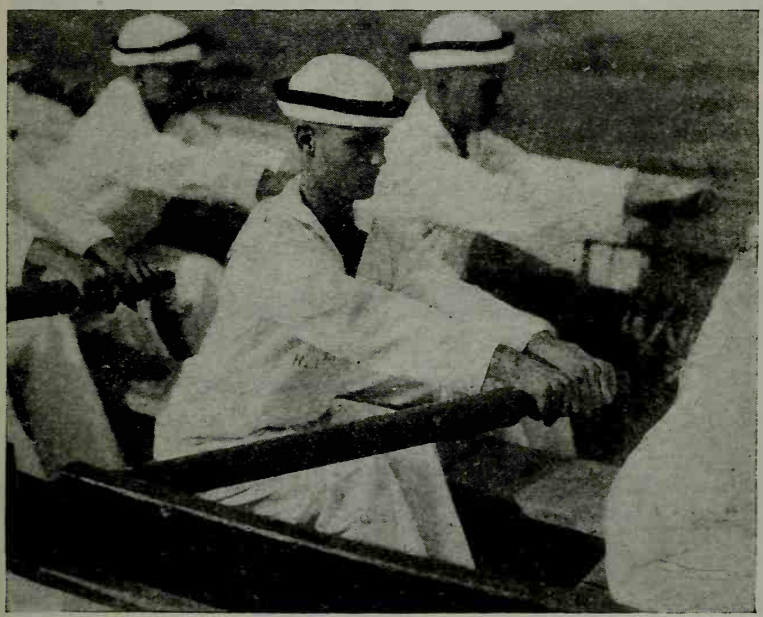


FIG. 11-1—Position No. 2, *Stand by to give way.*

Position No. 2.—This is the position at *Stand by to give way* or the beginning of the stroke. (Fig. 11-1.) The man leans well forward, arms out straight, wrists straight, eyes directly astern, the blade of the oar

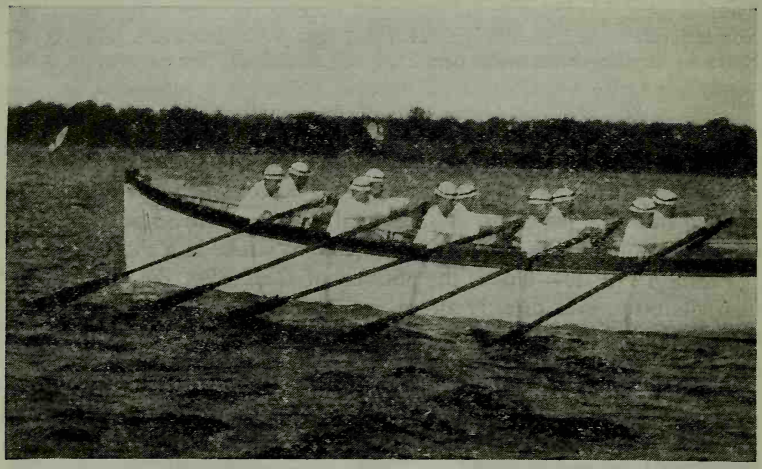


FIG. 11-2—Position No. 3, middle of stroke.

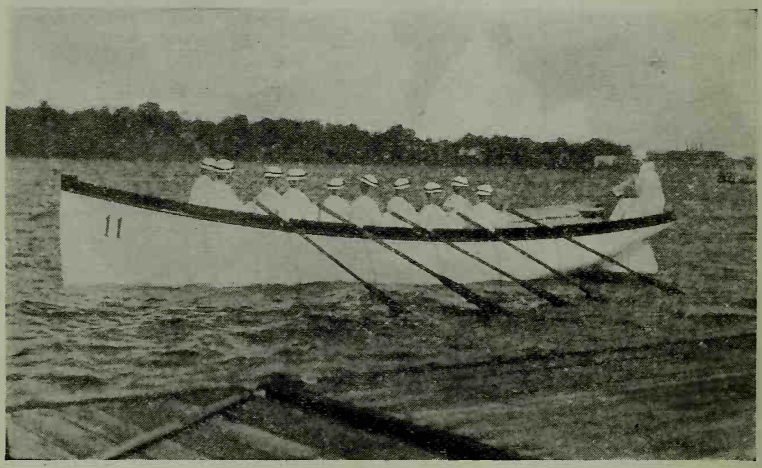


FIG. 11-3—Position No. 4, end of stroke.

vertical and just clear of the water. Note that the hands are in the natural position for a heavy pull.

Position No. 3.—This is the *Middle of the stroke.* (Fig. 11-2.) The blade entered the water from position No. 2, and the pull up to this time has been made by leaning back. The arms are still straight, eyes astern.

Position No. 4.—This is the *End of the stroke.* (Fig. 11-3.) This is made by giving a final pull with the arms. The blade is pulled out of the water at the finish of the pull.

Position No. 5.—This is the *Recovery.* As the blade comes out of the water, the wrists are bent down, causing the blade to lay flat with the water. This is known as *feathering the oar* and is always done in order to lessen the wind resistance or the resistance due to spray. The position of the beginning of the stroke is now taken by the man leaning forward and straightening his arms, the oar being carried in a horizontal position.

NOMENCLATURE

The recognized nomenclature of the principal parts of boats and their fittings is as follows:

Apron.—A timber fitted abaft the stem to re-enforce the stem and give a sufficient surface on which to land the hood ends of the planks.

Beams.—Transverse supports running from side to side to support the deck.

Bilge.—The part of the bottom, on each side of the keel, on which the boat would rest if aground.

Binding strake.—A strake of planking, usually thicker than other planks, fitted next to and under the sheer strake.

Blade, oar.—The broad flattened part of an oar as distinguished from the loom.

Boat falls.—Blocks and tackle with which the boats are hoisted aboard at davits.

Boat hooks.—A pole with a blunt hook on the end to aid in landing operations or hauling alongside.

Boat plug—A screwed metal plug fitted in the bottom planking of the boat at the lowest point to drain the bilges when boat is out of the water.

Boom.—The long pole or spar used to extend the foot of a fore and-aft sail, for example, main boom, jib boom.

Bottom boards.—The fore-and-aft planks secured to the frames, or to floor beams, forming the floor of the boat, frequently removable.

Bowsprit.—A small metal or wood spar attached to the bow to take the jib stay.

Braces, rudder, upper, and lower.—Strips of metal secured to the rudder, the forward ends of which fit over the rudder hanger on the sternpost, thus securing the rudder and forming a pivot upon which the rudder swings.

Breaker.—A small cask for carrying potable water.

Breasthook.—A wood or metal knee fitted behind the stem structure.

Cabin.—A compartment, usually for passengers, in a covered boat.

Capping.—The fore-and-aft finishing piece on top of the clamp and sheer strake, at the frame heads, in an open boat.

Carling.—A fore-and-aft beam at hatches.

Chain plate.—A metal plate with an eye in the upper end, fitted at the deck edge or gunwale to take the shrouds or shroud whips; also used for steadying lines during lifting.

Chock.—A metal casting used as a fair lead for a mooring line or anchor chain.

Clamp.—A main longitudinal strengthening member under the deck in decked-over boats and at the gunwale in open boats.

Cleat.—A horned casting for belaying lines.

Clew (of a sail).—The lower after corner of a fore-and-aft sail.

Cockpit.—A compartment, usually for passengers, in an open boat.

Deadwood.—Timber built on top of the keel or shaft log at either end of the boat to afford a firm fastening for the frames and to connect the keel to the end timbers.

Fenders.—Portable wooden or rope sennit bumpers hung over the side during landings to protect the hull.

Flat.—A walking surface in the engine-room or any special platform, such as the coxswain's flat.

Floors.—The transverse timbers which re-enforce the frames and carry the strength athwartships across the keel.

Footlings.—Bottom boards or walking flats attached to the insides of the frames on boats where deep floors are not fitted.

Foot of sail.—The lower edge of a fore-and-aft sail.

Foresheets.—The portion of the boat forward of the foremast thwart.

Frames.—The ribs of the boat; curved timbers, frequently steam bent, secured to the keel and extending upward to the gunwale or deck.

Gaff.—A spar used to extend the upper edge of the quadrilateral fore-and-aft sail of a sloop or a schooner rig.

Garboard.—The lowest strake of outside planking next to the keel.

Gooseneck.—A hook-shaped fitting on the forward end of main boom, used for securing the latter to the mainmast. It permits free movement of the after end of the boom in any direction, with the gooseneck as a center. Sometimes called a pacific iron.

Grapnel.—A small multiple-fluked anchor used in dragging or grappling operations.

Gripes.—The fitting used to secure a boat in its stowage position on board ship. For boats secured at the davit heads, gripes are made of tarred hemp woven with a wood mat, backed with canvas, to hold the boat against the strongback. For lifeboats, the lower ends of the gripes are usually fitted with a slip hook. For boats secured in cradles, the gripes are usually of metal, tightened with turnbuckles and arranged to prevent the boats from lifting from the cradles when the deck becomes awash.

Gudgeons.—Small metal fittings, similar to eyebolts, secured to the sternpost of very small boats on which the rudder hangs. Used in place of the rudder hanger of larger boats.

Gunwale.—The upper edge of the side of an open boat.

Halyards.—Ropes used to hoist and lower heads of sails or the yards or gaffs which spread heads of sails; also flag and signal hoists.

Hanger, rudder.—A vertical strip of metal, secured to the sternpost, forming the traveler upon which the rudder braces are secured.

Head of sail.—The upper corner of a triangular sail. The upper edge of a quadrilateral sail.

Heel of mast.—The lower end of the mast; the end of the mast which fits in the step on the keel.

Hoisting pads.—Metal fittings inside the boat often attached to the keel to take the hoisting slings or hoisting rods.

Horn timber.—The after deadwood (often called counter timber) fastening the shaft log and transom knee together.

Keel.—The principal timber of a boat, extending from stem to stern at the bottom of the hull and supporting the whole frame.

Keel stop.—A small metal fitting on the keel, at the after end, to act as a stop in locating the boat in a fore-and-aft position on the keel rest when stowing the boat in the cradle.

Ketch rig.—A two-masted sailing rig with the larger sail forward. It can be designed with either triangular or boom and gaff sails. The jigger mast is stepped forward of the tiller, thus differentiating it from the yawl rig which has the jigger mast stepped abaft the tiller.

Keelsons.—Fore-and-aft structural timbers either above or outboard of the keel.

Knee.—A shaped timber for connecting construction members installed at an angle to each other. Some knees are sawed from straight-grained wood, while in other cases the grain follows the natural bend of the tree at a limb or root.

Leech.—The after edge of a fore-and-aft sail.

Leather.—The portion of an oar which rests in the rowlock. This is sometimes covered with canvas, but is usually covered with leather.

Loom.—Rounded portion of an oar between the blade and handle.

Luff.—The forward edge of a fore-and-aft sail.

Lug rig.—Applied to large quadrilateral sails bent to yards that hang obliquely to the mast, the halyards being secured nearer to one end of the yard than to the other. In the "standing lug" rig used in the Navy, the foretack is lashed or hooked to an eyebolt on the after side of the foremast.

Main boom.—The boom on the mainmast which spreads the foot of the mainsail.

Mast clamp.—A metal fitting for securing a mast at a thwart.

Mast step.—A small metal receptacle on the keel in which the heel of the mast rests.

Norman pin.—A metal pin fitted in a towing post or bitt for belaying the line.

Pacific iron.—Gooseneck fitting for securing the boom to the mast. (See Gooseneck.)

Painter.—A rope used in the bow for towing or for securing the boat.

Peak.—The upper after corner of a quadrilateral fore-and-aft sail.

Pintles.—Small straight pieces of metal secured to the rudder and fitting in the gudgeons on the sternpost of very small boats, thus supporting the rudder. Pintles and gudgeons are used in place of the rudder braces of larger boats.

Plank-sheer.—The outermost deck plank at the side.

Reef points.—Short ropes attached to a sail which are used to shorten sails in heavy weather.

Risings.—The fore-and-aft stringers inside a boat, secured to the frames, on which the thwarts rest.

Rowlocks.—Forked pieces of metal in which the leathers of oars rest while pulling. *Sunken rowlocks* are those which are set down in the gunwale of the boat. *Swivel rowlocks* rotate, the shank of the rowlock fitting in a socket in the gunwale.

Sail tracks.—A device fitted up the mast on the after side in which slides, attached to the sail, travel in hoisting; used in lieu of mast loops.

Shaft log.—A timber connecting the keel to the after deadwood, through which the shaft passes.

Sheer.—The line of form at the side which the gunwale or deck edge follows in profile.

Sheer strake.—The uppermost strake of planking at the side following the line of sheer.

Sheets.—The lines secured to the clew of a sail, or to the main boom, used to trim the sail and hold it in position.

Shrouds.—Lines stretched from the masthead to a boat's rail. They support the mast on each side.

Shroud whip.—Lines used to haul the shrouds taut.

Side fender.—A longitudinal timber projecting beyond the outside line of the hull planking, often metal faced, to protect the hull.

Slings.—Gear made of wire rope and close-link chain for handling boats at booms or cranes.

Sloop rig.—Consists of a large fore-and-aft quadrilateral sail with gaff, boom, and jib. With triangular mainsails without gaffs, it is often called a Marconi rig.

Spars.—Masts, booms, and gaffs upon which, when stepped in the boat, the sails are spread.

Sprit rig.—Consists of a single mast carrying a large quadrilateral sail, the peak of which is held out by a light, movable, wooden sprit which, when in place, extends from the peak of the sail to a rope stirrup on the lower part of the mast.

Steering rowlock.—A form of swivel rowlock, fitted near the stern of a whaleboat or motor whaleboat, in which the steering oar is shipped; sometimes called a crutch.

Stem.—The upright timber in the forward part of a boat, joined to the keel by a knee.

Stem band.—A metal facing or cutwater fitted on the stempost.

Stem heel.—The forward deadwood. A timber, often called the sole piece, used to connect the stem knee to the keel.

Stern fast.—A stern painter for use in securing the stern of a boat.

Stern hook.—Same as breasthook, for stern on a double-ended boat.

Sternpost.—The principal vertical piece of timber at the after end of a boat, its lower end fastened to the keel or shaft log by a stern knee.

Stern sheets.—The space in the boat abaft the thwarts.

Strakes.—Continuous lines of fore-and-aft planking. Each line of planking is known as a strake.

Stretchers.—Athwartship, movable pieces against which the oarsmen brace their feet in pulling.

Stringers, bilge.—Longitudinal strengthening timbers inside the hull.

Strongback.—The spar between the davits to which a boat is griped.

Tack.—The forward, lower corner of a fore-and-aft sail.

Tarpaulin.—A water-proof fabric cover to keep stores dry while being transported.

Tholepin.—A pin fitted in the gunwale plank for use in place of a rowlock. Used with Manila ring about 5 inches in diameter, called a tholepin grommet.

Throat.—The forward, upper corner of the quadrilateral fore-and-aft sail in a sloop rig; also called the nock.

Thrum mats.—Mats made of a small piece of canvas, with short strands of rope yarn sewed on them, called "thrumming." These are placed between the rowlocks and the oars to prevent noise in pulling.

Tiller.—A bar or lever, fitted fore and aft in the rudder head, by which the rudder is moved.

Topping lift.—A line used for supporting or hauling up the boom of a fore-and-aft sail.

Towing bitts.—Often called towing posts. A vertical timber securely fastened for use in towing or mooring.

Trailing lines.—Small lines secured to the boat and around the oars to prevent the latter from getting adrift when trailed from swivel rowlocks.

Transom.—The planking across the stern in a transomed boat.

Traveler.—A metal rod on the stern to carry the main sheet block.

Truck.—A fitting, usually of metal, fitted at the upper end of a flagstaff or mast.

Yard.—A spar to which the head of a square or lug sail is attached. The term lug is applied to the forward part of it when it has to be dipped (in some rigs) from one side to the other of the mast in going about.

Yoke.—Athwartship piece fitting over the rudder head, by which the rudder is moved by yoke ropes when the tiller is not shipped.

NOTES ON HANDLING BOATS UNDER OARS

In going into a crowded or difficult landing, pull easily and keep the boat under control with the oars as long as possible, laying on oars if necessary, and boating oars only at the last moment.

In going through a narrow entrance, get good way on the boat, then trail or toss the oars.

A loaded boat holds her way much longer than a light one.

In pulling across a current, try to make good a straight line by steering up stream from the line you want to make good.

Having a long pull against the tide, run near shore where the tide is slacker than in midstream, and where there is sometimes an eddy.

There should always be a lantern, filled and trimmed, in the boat, and boats should never leave the ship for a trip of any great length without a compass. Weather is liable to thicken at any time, and a boat without a compass would have difficulty in reaching a landing or returning to the ship. For this reason, boat officers and coxswains of running boats should at all times know the compass course between the ship and landing; and if they are away from the ship and it begins to thicken, they should at once observe the compass course before the ship is shut in.

At sea, no boat should ever leave the ship without a compass, water, and provisions, and, except lifeboats, all boats sent away from a ship at sea will carry rifles and ammunition.

Never go alongside a vessel which has sternway or which is backing her engines.

In coming alongside in a seaway or when a strong tide is running, warn the bowman to look out for the boat line which will be heaved from the ship.

If caught in a gale in an open boat, rig a sea anchor by lashing the spars and sails together, sails loosed. Fit a span to this and ride by the painter. If there is oil in the boat, secure a bag full of waste saturated with oil to the sea anchor.

CHAPTER 12

KNOTS AND SPLICES

Knots 94
Long and short splices 96

KNOTS (Also see Chap. 34)

EVERY sailor should take pride in knowing how to make the knots ordinarily used in our modern Navy. Only the ones most commonly used will be described here but others are shown in Fig. 12-2. Practice making them so that you can tie them perfectly and quickly. Many times speed in making these knots is very important.

Uses

Overhand knot.—Used in making other knots; never used alone.

Square knot or *reef knot.*—Used for tying reef points and bending ropes together.

Figure-of-eight knot.—Put on end of rope to prevent end from unreeving through a block or eyebolt.

Bowline.—Used wherever you want a knot that will not slip.

Running bowline.—A bowline made around the standing part.

Bowline on a bight.—Used to sling a man over the side.

Half hitch.—Used for making fast a line to post or spar.

Two half hitches.—Used same as half hitch. Two half hitches are much better than one.

Clove hitch or *ratline hitch.*—Used to fasten ratlines to shrouds.

Timber hitch.—Used for towing spars.

Timber hitch and half hitch.—Used same as timber hitch. The half hitch placed near end of spar assists in towing spar fore and aft.

Round turn and half hitch.—Used for bending a line to an anchor.

Blackwall hitch.—Used for securing hook to bight of rope quickly.

Cat's-paw.—Used same as Blackwall hitch.

Sheepshank.—Used for shortening bight of rope.

Marlin hitch.—Used for lashing hammock.

Sheet or *becket bend.*—Used for bending rope to becket.

Sheet or *becket bend (double).*—Used for bending rope to becket; more secure than a single bend.

Knots are divided into four general classes:

(1) Knots in the ends of ropes.
(2) Knots for bending two ropes together.
(3) Knots for securing lines to rings or spars.
(4) Knots worked in the ends of ropes.

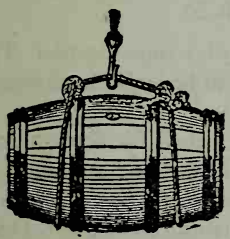
Every sailorman should pride himself in knowing how to make the knots and the proper use of them.

The following knots are used for bending two ropes together:

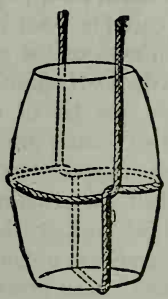
Square knot.
Two bowlines.
Single carrick bend.
Reeving line bend.—Used where line is to be rove through block.

The following show how casks, bales, etc., can be hoisted aboard: (See Fig. 12-1.)

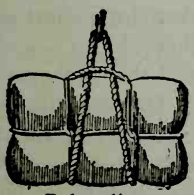
Bale sling.—For hoisting bales or boxes.
Hogshead sling.—For hoisting casks or drums.
Parbuckle.—To parbuckle cask or drum.
Sling a cask, head up.



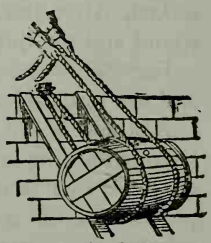
Hogshead sling.



Sling a cask, head up.



Bale sling.



Parbuckle.

FIG. 12-1.

NAVY KNOTS AND SPLICES (See Fig. 12-2)

1 Chain knot
2 Victory knot
3 Grommet, French whipped
4 Half hitch
5 Two half hitches
6 Inside clinch
7 Fisherman's bend
8 Double diamond
9 Double carrick bend
10 Single diamond
11 Round turn, two half hitches
12 Studding-sail, tack bend
13 Bowline
14 Bowline on a bight
15 Grommet served
16 Single sheet or becket bend
17 Granny knot
18 Mast head
19 Double bowline
20 English diamond knot
21 Inside clinch and half hitch
22 Double sheet or becket bend
23 Clove hitch
24 Spanish bowline
25 Grommet
26 Overhand knot
27 Double overhand
28 Short splice
29 Sailmaker's splice
30 Eye splice served
31 Eye splice whipped
32 Back splice
33 Manrope knot
34 Single Matthew Walker
35 Double Matthew Walker
36 Cross pointing a hawser
37 Shroud knot
38 Cross pointing a hawser
39 Matthew Walker, a strand
40 Sheepshank knotted
41 Crabber's eye knot
42 Single carrick bend
43 Square knot
44 Timber hitch
45 Reeving line bend
46 Running bowline
47 Lineman's knot
48 Japanese knot
49 Double Turk's-head
50 Draw knot
51 Sheepshank
52 Open carrick bend
53 French carrick bend
54 Surgeon's knot
55 Single Turk's-head
56 Blockade knot
57 Figure-of-eight knot
58 Hackamore

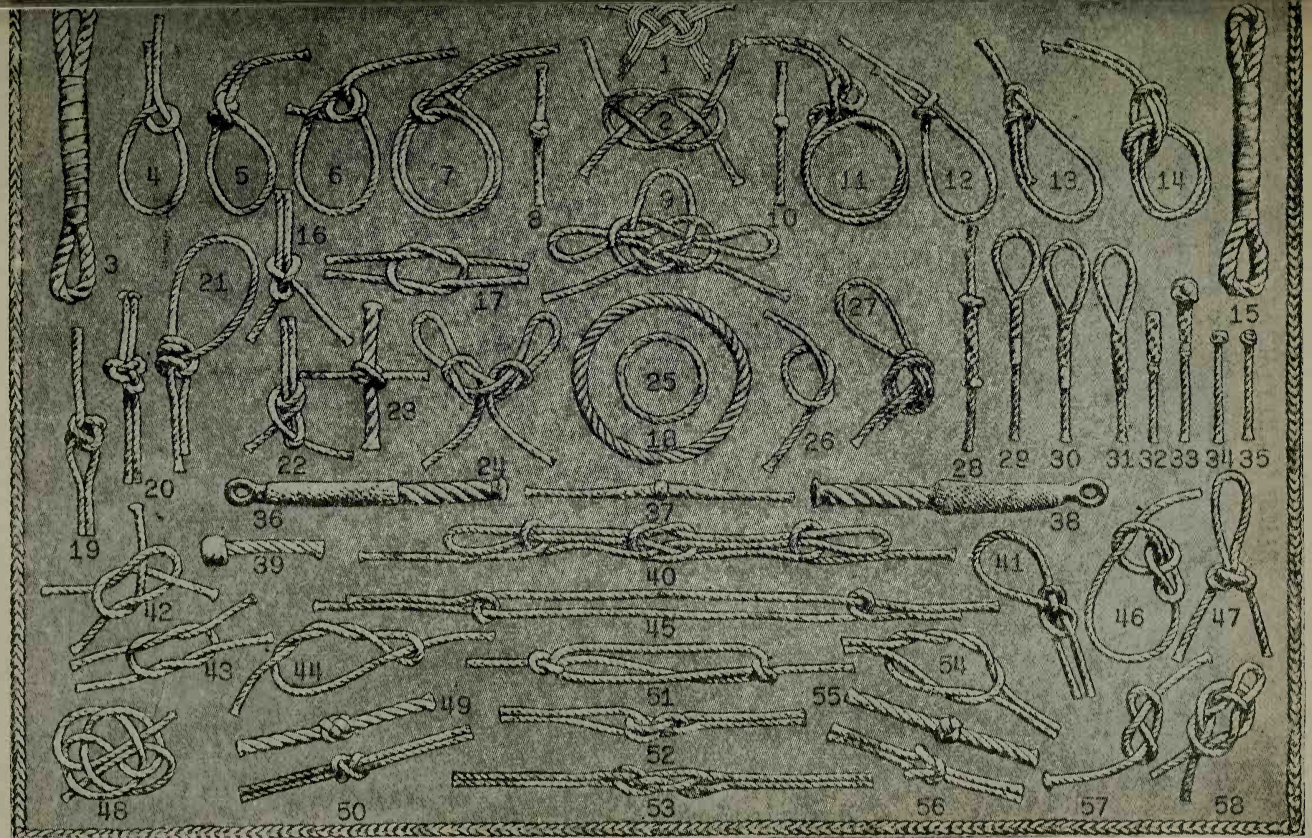
LONG AND SHORT SPLICES

Both splices are used for bending two parts of a rope together. The long splice is used where the spliced part is not to be larger in diameter than the rest of the rope. (See Fig. 34-4.)

For a *short splice,* both ends of the rope are unlaid for about a foot and the strands are interlaced. Beginning with any one strand, it is tucked from *left* to *right,* the lay of the rope being opened with a marlinespike. The other two strands are tucked from *right* to *left.* One-third the threads are then cut away from each tucked strand and again tucked. After this, one-half the remaining threads are cut from each strand and the third and last tuck is taken.

For a *long splice,* the ends are unlaid farther than for a short splice and are similarly interlaced. Then proceed as follows:

A strand of one piece is unlaid for a distance and the corresponding strand from the other piece is laid in the opening. The remaining ends of these two strands are twisted together for convenience, the rope turned end for end, and the first operation repeated with two other corresponding strands. The remaining strands of each part are left at their original place. Thus pairs of strands are at three positions. Each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strand is halved, two halves at each position are tied together with an overhand knot, and the other two halves are tucked over one and under one of the full remaining strands.

CHAPTER 13

THE COMPASS

Description 99
Relative bearings 102

DESCRIPTION

A SIMPLE straight-bar magnet suspended by a string and allowed to move freely will, when it settles down, point to the north magnetic pole. This is a simple magnetic compass. Of course, this type could not be used aboard ship, but the principle is the same. On board ship we have a circular card which is balanced on a needle-point at its center, so that it can revolve freely. Attached to this card are four magnets, two on each side of the center. The needle is mounted on a pivot in a bowl and the bowl filled with alcohol, which will not freeze. This alcohol keeps the card from wobbling or moving too quickly. On top of the card is a little air chamber to help take the weight of the card and its magnets off the needle-point.

The face of the card is marked with "points" and degrees. The main or cardinal points are north, or 0°; east, or 90°; south, or 180°; and west, or 270°. Between these main or cardinal points are four intercardinal points. To box the compass is to name the points in regular succession, beginning at one point and ending with the same.

Below is given the boxing of the compass by intercardinal points, beginning with north and going around clockwise back to north, with the corresponding degrees.

North	0°
Northeast	45°
East	90°
Southeast	135°
South	180°
Southwest	225°
West	270°
Northwest	315°
North	360° or 0°

The lubber's line is a vertical line drawn on the inside of the bowl of the compass to correspond with the ship's head. The point on the compass card coinciding with this lubber's line gives the heading of the ship, or the course being steered.

All courses steered by our ships are given in degrees, as course 045°, course 196°, etc. You should learn the four cardinal points with their degrees and also the four intercardinal points with their degrees. The main thing is to know the markings in degrees. The Navy standard compass card, showing the four cardinal and four intercardinal points and degrees, is illustrated in Fig. 13-1.

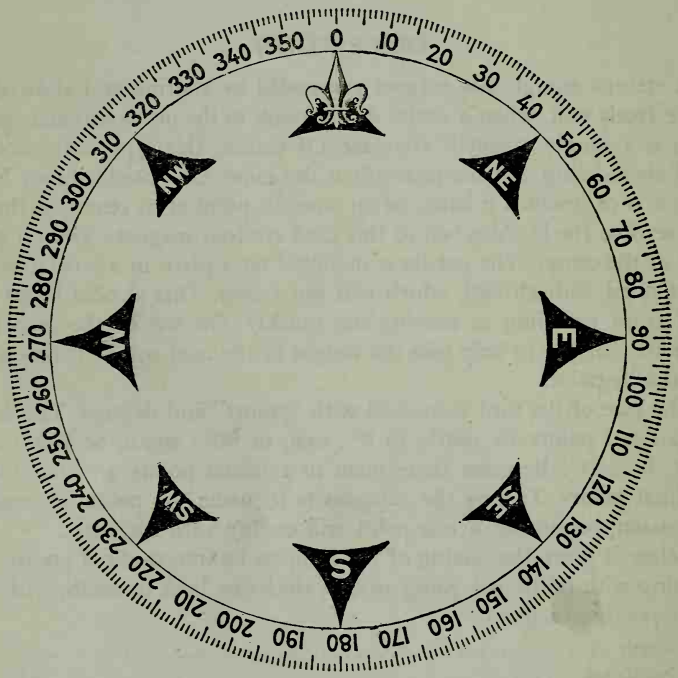


FIG. 13-1—Navy standard compass card.

The earth is a big magnet with a north magnetic pole and a south magnetic pole. Any magnet on the earth, as the magnets in the compass, will have its north-seeking pole attracted by the north pole of the earth and, if the magnet can swing around as our compass magnets can, the north-seeking pole of the magnet will point to the north magnetic pole of the earth. Now all magnets work on other magnets near them and attract or repel each other. Besides, all iron is magnetic and acts like magnets. Our poor compass then, unless it happens to be aboard a ship

that hasn't a piece of iron in her, is being pulled and pushed by many other magnets due to the iron of the ship. The compass, with its bowl, is placed in a binnacle, or a little compass house. In the binnacle are

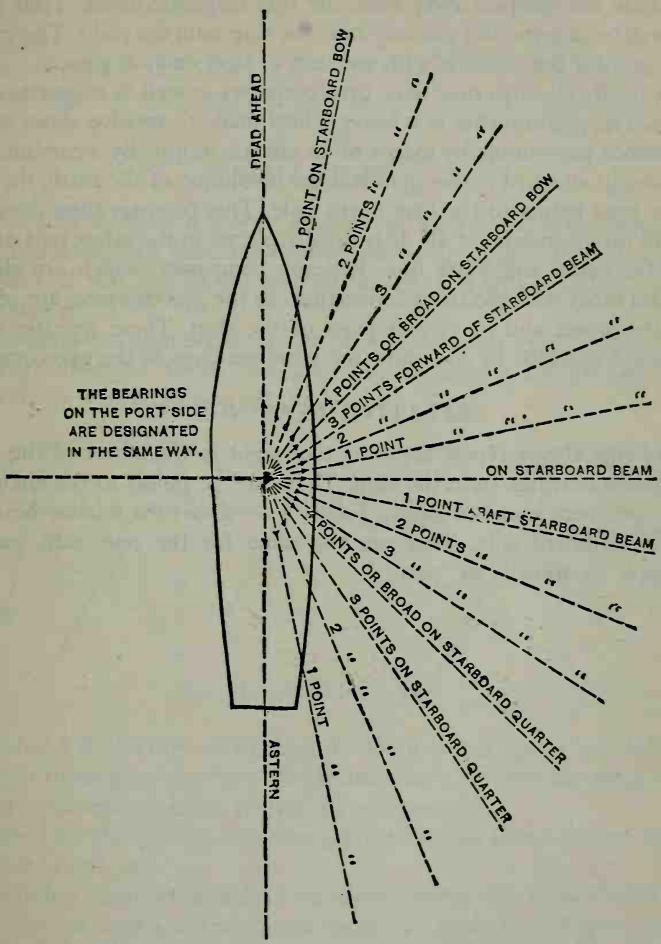


FIG. 13-2.

magnets and two iron balls which are used to neutralize the magnets of the ship, so that the compass will point to the earth's magnetic pole. Now the iron on the ship is riveted in place and the compass can be corrected

for the magnetism in this iron. But what happens if you come up to take the wheel with a jackknife or a bunch of iron keys in your pocket? This knife and any iron you have in your pockets will contain magnetism and will draw the compass away from the true magnetic north. Your compass will be in error and you may steer the ship onto the rocks. Therefore, never go near the compass with any iron or steel on your person.

Practically all ships now have gyrocompasses as well as magnetic compasses. The gyrocompass is a heavy wheel made to revolve about 8,000 revolutions per minute by means of an electric motor. By a combination of a weight attached to this gyro and the revolution of the earth, the axis of the gyro points to the true north pole. This compass then does not depend on magnetism at all. It is usually placed in the safest part of the ship, far below the water line. Repeater compasses, which are simple compass cards with electrical connections to the gyrocompass, are placed near the wheel and in various parts of the ship. These repeater compasses are operated by and show the same readings as the gyrocompass.

RELATIVE BEARINGS

Lookouts always report anything they sight to the officer of the deck by relative bearings from the ship. There are 32 points to the circle, or 16 points from ahead to astern. Figure 13-2 shows the relative bearings on the starboard side. They are the same for the port side, merely changing "starboard" to "port."

CHAPTER 14

VISUAL SIGNALING

Semaphore 103
Semaphore alphabet 104
Procedure signs 105
Calls 105

SEMAPHORE

To BE able to signal is a great asset to any man in the Navy irrespective of his rating. All men must know how to signal by means of semaphore and, if you stay in the seaman branch, you will be called upon often to use it.

Semaphore is a signal system designed to transmit rapidly messages over short distances during daylight. The distance is limited only by the ability of the receiver to see the sender.

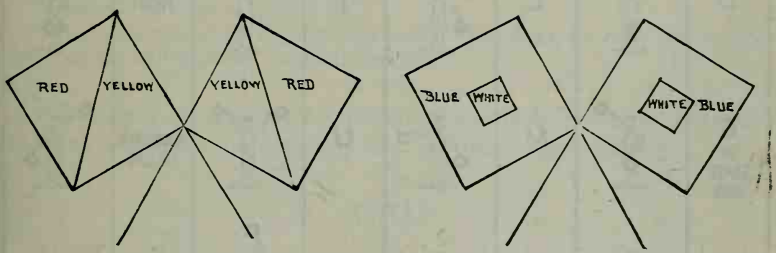


FIG. 14-1—Semaphore flags.

Two hand flags (Fig. 14-1) from 15 to 18 inches square are used, if available, although white hats, or handkerchiefs, or even the arms may be used in an emergency or if flags are not available.

Figure 14-2 shows the semaphore alphabet as the letters appear when the sender faces you.

In sending, each letter should be made clearly, the arms should be fully extended, and a distinct pause should be made at each exact position. Changes from one position to the next should be by the shortest route, and only one arm should be shifted in cases where it is not necessary to move both. In Fig. 14-2 the uses of *Answering* and *Attention* are obvious; *Front* is used to indicate a pause, as between words.

Always spell out numbers.

THE SEMAPHORE ALPHABET

CHARACTERS	HAND FLAGS	CHARACTERS	HAND FLAGS	CHARACTERS	HAND FLAGS	CHARACTERS	HAND FLAGS
A		I		Q		Y	
B		J		R		Z	
C OR ANSWERING SIGN		K		S		ATTENTION	
D		L		T		FRONT	
E OR ERASE SIGN		M		U		NUMERALS FOLLOW	
F		N		V			
G		O		W			
H		P		X			

FIG. 14-2.

PROCEDURE SIGNS

Procedure signs ordinarily used are given below. Letters overscored are made as one word:

Erase	EEEEEEEEEE
Question Mark or Repeat	$\overline{\text{IMI}}$
Break	$\overline{\text{BT}}$
Number of words or groups	GR[1]
End of word	Front
End of transmission	$\overline{\text{AR}}$
Repeat all before word	$\overline{\text{IMI}}$ AB word
Repeat all after	$\overline{\text{IMI}}$ AA word
Repeat word after word	$\overline{\text{IMI}}$ WA word
Received	R[2]
Move to your right	MR
Move to your left	ML
Move up	MU
Move down	MD

[1] Followed by number spelled out.

[2] Used only when call flags are not used. When flags are used, the hauling down of the call signifies "despatch received."

All systems of signaling require much practice. Two men practicing together will learn more quickly than by practicing separately.

CALLS

(1) To call a ship or unit, flag hoists are used. Each ship is assigned a call letter, which is made by means of these flags.

(2) To call without the use of flag hoists, face the person or station called and make the attention sign. If this is not sufficiently definite, three or four letters abbreviating the name of the person or station will be used as a call. To answer a call, make the answering sign.

(3) As an example for use in signal drill at a training station, John Doe wishes to send the following message to James Pederson: "Come over to smoker tonight."

(4) John Doe faces James Pederson and makes *Attention* sign. If James Pederson fails to get the call, John Doe will send the abbreviation "ped" until the call is answered by the *Answering* sign.

(5) As soon as John Doe's call is answered as above, the procedure for sending and receiving the signal is as follows:

(6) Letters MSG in the text indicate that the despatch is unofficial.

John Doe (sending)	James Pederson (receiving)
(a) Makes *Front*	Do.
(b) Makes GR5 BT MSG	Do.
(c) Makes *Front*	Do.
(d) Sends the 5GR message	Do.
(e) Makes *Front* after each group	Do.
(f) Makes AR at end of message	Makes R to show that message is received and understood.

(7) In case the message is not understood, the man receiving can ask to have any part of it repeated by using the repeat signal $\overline{\text{IMI}}$ followed by the letter indicated in the "Procedure Table."

8) For the flag alphabet, see Plates IV, V, and VI in front of book. These plates also give the spoken names of the flags.

CHAPTER 15

*HOW TO SWIM**

Requirements 107
Strokes 109
Treading water 117
Conclusion 117

THE REQUIREMENTS

FAIR HEALTH, normal mentality, co-ordination, and confidence are all that are required to learn how to swim. We will assume that the beginner already qualifies in the first two requirements, and that he will express his co-ordination qualifications in the rapidity with which he learns. Aside from these more or less natural requisites and a thing which is primary to the beginner is *confidence.*

The beginner must have confidence in the water to support him, and he must have confidence in himself to get his feet on *terra firma* any time he chooses. He must also have confidence in the instructor and his method. The instructor should do everything in his power to prevent the beginner from getting strangled. Be patient, reason with him, do not be too hasty. Remember this: The more you understand and sympathize with his fear of the water, the more you reason with him, the more confidence he will have in you and the more quickly he will learn.

To make the instruction as brief and as clear as possible, let us assume that we are in the water. I am the instructor, you are the beginner.

Come on over to the side of the tank; hold your hands out in front, palms down. I am facing you and have my hands extended, palms up. Now place your hands upon mine. Do not grasp them, but just rest your weight slightly upon my hands. Presently I am going to walk backward through the water as fast as I can, drawing you forward through the water on your stomach. Do not be afraid. I promise you that I will not let you get any water on your head. Straighten and stiffen your body into a straight line; take a deep breath. Here we go; that's fine. Now, what held you up? "The water." That's right; the water held you up.

* Prepared by Mr. GRAHAM CURRY, Physical Director, Y.M.C.A., San Diego, Calif.

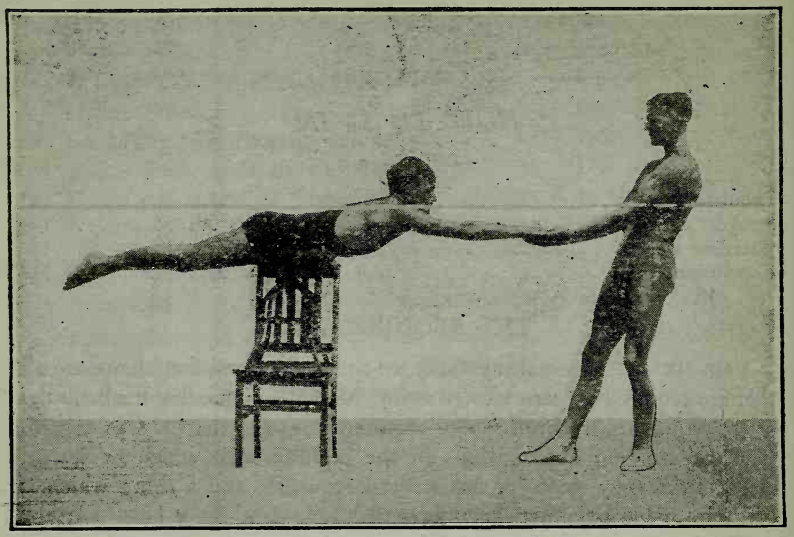


FIG. 15-1—Towing.

You really couldn't go down and sit on the bottom unless you let all the air out of your lungs. We will repeat this about half a dozen times, after which we will let you shove off by yourself.

Now I am about 10 feet from the side of the tank and I am facing you. Place your right foot against the side of the tank, take a deep breath, and shove off toward me. Straighten your body. I will catch you by the arms and raise you up. I promise I will not let you get strangled. Are you ready? Shove off; that's fine. I will stand back a little farther this time. Great!

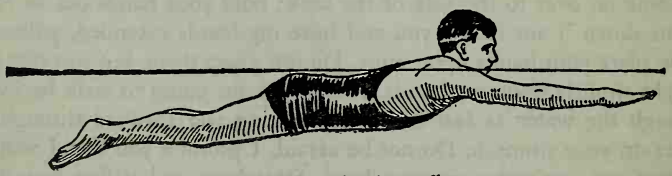


FIG. 15-2—Shoving off.

Keep your arms and hands straight out in front of your head, hands with palms down, and pointing slightly upward. The thumbs are locked. Lay your face in the water.

Now you must learn how to get your feet on the bottom so you will be able to shove off, coast across the tank, and stand on your feet without any aid from me. Look! I am coasting through the water; to get my feet on the bottom I simply pull backward and downward with both arms at the same time, and simultaneously I draw my legs and thighs forward and upward. Nothing to it! See how easily I come to a stand? Now you try it. I will stand by to catch you in case you should not do it in good form the first time. Great! Now let's see you do it yourself half a dozen times. Do not get excited; keep cool.

THE STROKES

The dog paddle.—This is the stroke which may be learned most quickly. This is true simply because it is most natural. The young puppy a week old swims it very proficiently the first time he is thrown into the water. Pigs, cows, horses, chickens, ducks, rats, cats, and any animal which may be thrown in the water will swim this stroke, with the exception of the snake, the frog, and the human being. The snake swims like the fish, that is, by sculling. The frog swims a breast stroke, but the human being will drown in most instances if someone does not pull him out. The cause for this is that we can reason. Our superior intelligence warns us with the startling suggestion that we are going to drown because we cannot swim. No man is going coolly to feel himself drown without doing something about it; so we immediately rush into a fit of excitement, thereby stiffening our extremities. This procedure simply aids us in drowning more quickly. The animal cannot reason. When it is thrown in it does not know of the possibility of drowning. It feels uncomfortable; it does not want to get water in its mouth and nose, so it starts walking, crawling, pulling, and in a very natural way soon reaches the shore, if it is not too far distant. Some human beings have been known to swim out when thrown in, but this is a rare thing, and it only serves to make the victim afraid of the water. Now I will show you the dog paddle. You will learn it and swim it all by yourself in less than 10 minutes.

Can you climb a ladder? That's all there is to it. The dog paddle is the same action exactly, except that you are lying on your stomach in the water and, instead of having to look for the rungs of the ladder to pull on with your hands and push against with your feet, you simply *pull the water* back with your hands and push it back with your feet. Your left hand and left leg work together, while your right hand and right leg work at the same time. Keep your fingers together with the thumbs

against your forefingers; slightly cup your entire hand. Now we will try the movement on land. Stand upright. Go through the motion of climbing a ladder; get the arms farther away from the body, though. As you move your hand upward it must be streamlined, so as not to cause head resistance. As it is brought backward it is *pulled* in a manner which will move the greatest amount of water. Raise the knees high and well underneath the body. Push them back strongly just as you would push on the rungs of a ladder if you were climbing. Be sure to let the left

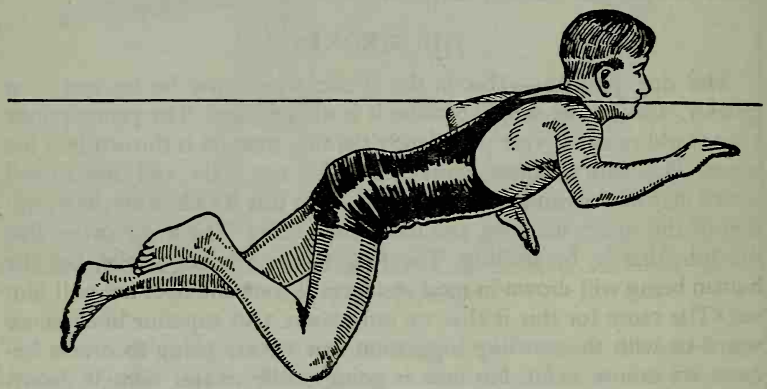


FIG. 15-3—Dog paddle.

leg and left hand follow each other up and down just as the right hand and leg follow each other. Fine! Now we will get in the water.

Do not be afraid. I promise you I will not let any water get in your mouth. I will now grasp you around the body just above your waistline. Now lie deep in the water. Deeper yet; tilt your head backward and barely let your mouth be above the surface. Now go through the "climb-the-ladder" movements. Do not get excited. I am holding you up. Keep cool and sink deeper in the water. You are working too fast, and you keep trying to get your head way up out of the water. You must be trying to *take off* and fly like a hydroplane; that's wrong; you must stay in the water if you intend swimming in it; you must sink deeply in it if you are to give it a chance to support your body. Try again; that's better. Now I want you to stand at the edge of the tank, place your right foot against it, take a big, deep breath, lay your face in the water, and shove off just as you did in the lesson of confidence; this time you will work the dog paddle for 6 strokes.

Be sure to count them, and do not quit until you have taken 6 strokes. At the end of the 6 strokes I will raise you up. There that's pretty good, but you worked too fast, too hard, and you were too stiff. Relax, loosen up, keep cool, and take it easier. This time I will not be there to raise you up. You know how to get your feet on the bottom. Fine! Now take 8 strokes. Now 10. Now this time you will swim without placing your face in the water, and you may take as many strokes as you choose; but remember, do *not* try to hold your head high above the surface; that only tends to sink you. Great! Now you can swim the dog paddle or elementary crawl stroke. What you want now is *more speed*. You'll get that in the side stroke, the side stroke with one arm out of water, then more speed with the trudgeon, and then still more speed with the trudge crawl, and finally your maximum speed with the American crawl. We will take that up in other lessons.

The side stroke.—This is the basis for all strokes except the breast stroke. The breast stroke is no longer used as a teaching method by modern swimming instructors. If one can swim a fair side stroke he may learn the trudgeon, the trudge crawl, the American crawl, and the back stroke, all of them in less than an hour's time. This is true because of the direct relationship between these strokes. This stroke is a little more difficult to learn than the dog paddle; but since confidence is essential to the beginner it is well that the would-be swimmer has a certain amount of faith in his dog paddle. This helps to relieve his mind of the fear of swallowing water, and therefore greatly aids in his progress.

Now get in the water. Lie on your right side, grasping the side of the tank with both hands. The right hand should be lower than the left. Be sure you are well on your right side. Now, (1) come to a full knee-bend position with both legs and thighs (maintain the position on the side). (2) Thrust the legs and thighs in a position like that of a dancer doing a full "split." (3) Close the legs fully extended in a long sweep to an erect or straight position. The legs and feet finish together, toes pointed.

When this movement is mastered at the side of the tank, shove off, lying on your side with your head under water. Take one good scissors kick. Try it again, taking 2 or 3 kicks. This is a powerful kick which propels one through the water with fair speed.

To learn the arm movements, stand upright in the water about chest deep. Stand with your feet about 20 inches apart. Hold both hands in front of your chest, palms down, the right just above

and over the left hand. Now streamline the right hand, reaching toward the right as far as possible. At the same time the left hand is pulled across and away from the body toward the left. Keep the hands under water.

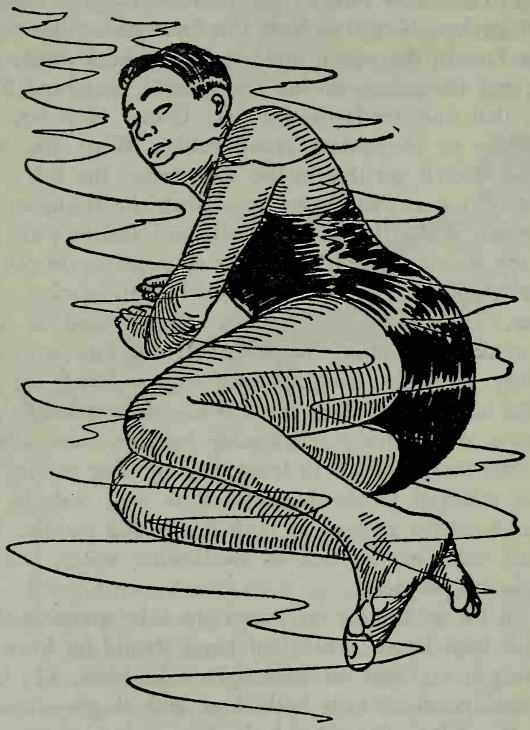


FIG. 15-4—Side stroke. Position No. 1.

Now pull hard with the right hand, in toward the chest, at the same time streamlining the left and bringing it to the same position, the starting position just under the right hand.

I will now grasp you about the waist from the rear, holding you on your right side. Now go through your scissors kick, gradually working your arm movement in with it. The legs are opened as the upper arm starts down, and snapped powerfully together as it finishes. The right hand works oppositely. Lie low in the water, take your time, and

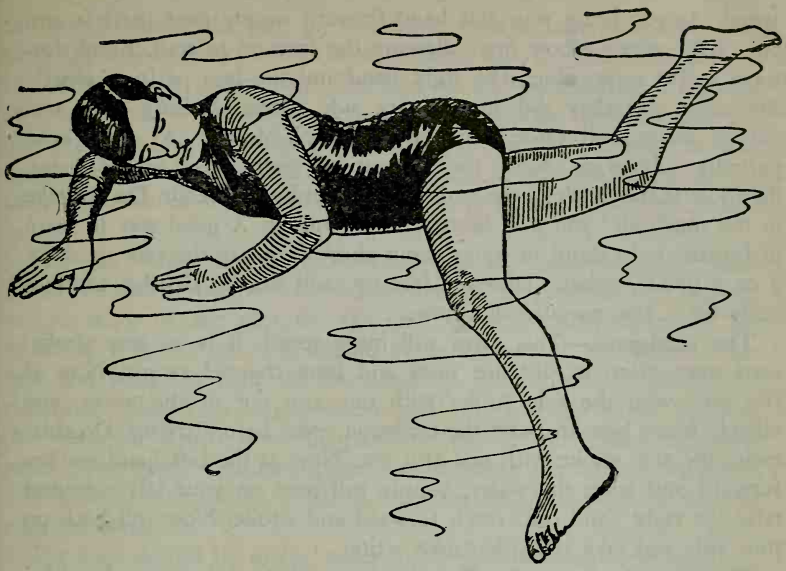


FIG. 15-5—Side stroke. Position No. 2.

make a pillow of the water on which to rest your head. The swimmer may lie on either side he chooses, although the right side is better, since it relieves the heart of an added amount of pressure.

Now shove off from the side all alone with your face in the water. Take about 2 strokes, then come to a stand. Increase the number of strokes as well as the effectiveness until you are able to swim the side stroke with your face partly out of water. The most common fault of the beginner here is to work too fast. Coast for a few feet after each stroke.

The side stroke with one arm out of the water.—This gives more

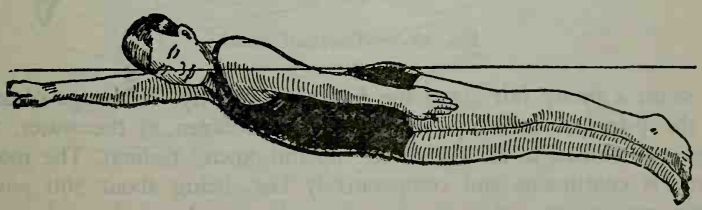


FIG. 15-6—Side stroke. Position No. 3.

speed. As you bring your left hand forward simply raise the left arm out of the water, elbow first, allowing the forearm to trail. Reach forward as far as possible. The right hand and the legs perform exactly the same way they did in ordinary side stroke. Raising your arm out of water will cause your body to sink deeper. As your head partially submerges, blow the air out of your lungs under water, then just at the finish of the stroke take an ordinary breath. Do not take in too much air; you may become filled with it. A good way to learn to breathe is to stand in water about chest deep, lay the face in about 3 or 4 inches, exhale, raise the face up, and inhale. Do this continuously for a few minutes at a time.

The trudgeon.—This gives still more speed. It is an easy stroke, used most often in distance races and long channel swims. Now if you can swim the side stroke with one arm out of the water, you already know how to swim the trudgeon, even before trying. Do this: Swim the side stroke with one arm out. Now as the left hand reaches forward and takes the water, simply roll over on your left side and raise the right hand out; reach forward and stroke. Now roll back on your side and take the side-stroke action.

The American crawl.—This is the world's fastest speed stroke. Here we have the close relationship to the trudgeon stroke. If you can swim a fair trudgeon stroke, you are to be congratulated, for you already know how to swim the American crawl. A few minor changes are all that are necessary, and they are so simple that you will be able

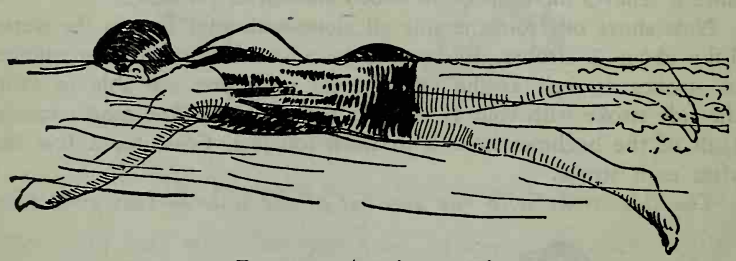


FIG. 15-7—American crawl.

to swim a pretty fair crawl the first time you try. A change of kick is the principal necessity. Lying on the abdomen in the water, the legs are worked in an alternated "up-and-down" fashion. The movement is continuous and comparatively fast, being about 300 power beats per minute; that is, the water is forced out from between

the legs at about the rate of 300 times each minute, and each beat propels the body forward. The knees are kept stiff, the ankles are allowed to remain limber and relaxed. The legs are moved apart for a distance of from 12 to 18 inches. The feet are barely brought to the surface. Do not get them out of water. Remember your propellers must be submerged to be effective. Do not allow them to get too deep, for the body must lie in a horizontal position if it is to make speed in the water.

The arm stroke is very much like that in the trudgeon except there is not as much roll. Reach as far forward as possible and straight out in front of the shoulder. Do not cross the arms over. At the finish of a stroke the arm should be raised out of the water *elbow first* and with the palm of the hand up. It is carried forward and sideward, relaxed in this position until the instant before entering the water, at which time the hand is turned, and enters the water palm downward. Common faults are twisting or rolling too much with head and shoulders, crossing the arms over, and stroking too fast with the arms.

The face should lie in the water to a depth determined by a line—the juncture of the forehead with the hair of the head. (See Fig. 15-8.)

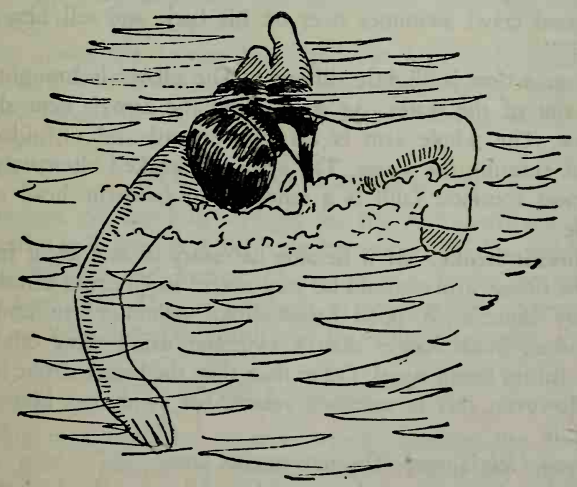


FIG. 15-8—American crawl.

There is absolutely no relation in time or number of beats of the feet to the number of arm strokes. Each works separately and independently of the other.

Relaxation and co-ordination are paramount to success in speed swimming.

For short races the swimmer should breathe about every 30 feet. In a longer swim a breath may be taken at the finish of each left-arm stroke by turning the head sharply back and to the left. The air is expelled from the lungs while the face is flat in the water. Breathing in the crawl is exactly like that in the side stroke with one arm out of the water.

The trudge crawl.—This is a combination of the trudgeon and crawl. Swim the trudgeon. Now at the finish of the scissors kick introduce two beats of the crawl kick. That's all there is to it. This is a great stroke for distance swimming. It is slightly faster than the trudgeon and is rather restful because of the variety of the kick. Breathe as in the trudgeon.

The American back stroke.—Here again we have a direct relation to a stroke already learned. The leg action is *exactly* the same as in the American crawl, the only difference being that the swimmer is on his back. Invariably the best crawl swimmers make the best back-stroke swimmers. As Mr. Eckhart, of Chicago, says: "Simply turn a good crawl swimmer over on his back and tell him to swim his crawl."

The arm action is slightly different. The elbow is brought up and forward out of the water. As it is raised the arm is bent sharply at the elbow. The whole arm is carried forward and unfolded at the instant of entering the water. The arms are worked alternately.

The most common fault is a tendency to raise the head and chest too high.

The breast stroke.—If it became necessary to stay afloat for several hours, the breast stroke would be very useful in effecting a rest through change of exercise. A good breast-stroke swimmer can undoubtedly remain afloat much longer than a swimmer using some other stroke, all other things being equal. Other than this, the breast stroke is of little value. However, this is sufficient reason for swimmers knowing how to swim it.

The *frog kick* is used. The movements are:

(1) With the swimmer lying on his abdomen, the legs are drawn up under him to the *full knee-bend* position.

(2) The legs are spread apart as wide as possible, knees straight.

(3) The legs are brought together with a powerful propelling motion and held straight with the knees and ankles together and the toes pointed, in which position they remain while coasting and until after the arm movements.

The *arm movement* consists of:

(1) Holding the hands, palms together, thumbs up but well against the forefingers. The hands are just under the chin. They are then shoved forward, rotating inward until the backs are touching; palms are outward, thumbs are down, and the arms are fully extended toward the front.

(2) The hands are *pulled* backward in the horizontal plane to the sides.

(3) They are again brought up under the chest in front of the chin.

The hands are shoved forward at the moment the legs are kicked; the body is held straight and almost rigid. When the coasting speed has partly slackened, the swimmer pulls with his arms. At the finish of the arm stroke the legs are drawn up and kicked.

Breathing may be accomplished by swimming with the head out of water, taking air at the finish of the arm stroke and expelling it while coasting, or by swimming with the face in the water and taking air and expelling it in the same way.

Common faults are failure to spread the legs wide enough just before the kick, letting the legs sink too deeply, arching the back, and stroking too fast. The swimmer should take advantage of the opportunity to *coast*.

TREADING WATER

This consists of standing upright in the water without the use of the hands, and may best be done by using the dog-paddle kick. Simply go through the motion of climbing a ladder or telephone pole with legs only. This is sufficient to support the body with the head high out of water. The hands may be employed at will.

CONCLUSION

Swimming is a healthful exercise which develops the body symmetrically. It is a pleasure sport and a safety factor for anyone who might chance to be near the water during his lifetime. Everyone should know how to swim, and anyone who already knows how may

improve style and speed with a few hours' practice. Speed depends upon style, co-ordination, strength, and endurance. Everyone who swims wants *more speed*. Practice often on your style and you will find that a *miracle* is performed, for through your practice of style you will have gained co-ordination, strength, and endurance.

Do not stiffen up, but stay relaxed as nearly as possible at all times.

CHAPTER 16

WHAT THE NAVY OFFERS

Service schools 119
General requirements for entry to service schools 120
Appointment of enlisted men to Naval Academy 121
Promotion to warrant rank 121
Promotion to commissioned rank 122
Pay grades 122
The future the Navy has to offer 123
Conclusion 123

SERVICE SCHOOLS

THE Bureau's policy in regard to service schools changes from year to year, depending upon the requirements of the fleet. The schools are grouped into three general classes, A, B, and C, as follows:

Class-A Schools

Group I Electrical
Ordnance
Group II Communications
Clerical

Group III Machinists
Metalworkers
Woodworkers

Group IV Aviation Machinists
Aviation Metalsmiths
Aviation Ordnancemen
Radiomen (Qualair)

Group V Bugler
Hospital Corps
School of Music
Diesel

Class-B Schools

Aviation Machinist's Mates (Primary)
Aviation Metalsmith
Bombsight School
Cooks and Bakers
Diesel Engine (Surface)
Fire Control (Advanced)
Gas Mask
Gyro Compass
Officers' Cooks and Stewards
Optical
Radio Operator
Sound Motion Picture Technicians
Stenography
Torpedoman

Class-C Schools

Aerographers
Airship Training
Automatic Pilot
Aviation Pilot Training
Aviation Instrument
Aviation Machinist's Mates
Aviation Ordnanceman
Bombsight (Advanced)
Bombsight Mechanics
Color Photography
Buglemaster
Deep Sea Divers
Dental Technicians
Diesel Engines
Electrical Interior Communication

Link Trainer
Mine Warfare
Naval Academy Preparatory
Optical
Parachute Material
Parachute Troop School
Pharmacist's Mates
Photographer
Photographer (Slidefilm)
Radio Material
Recruiting Training
Submarine Training

Class-A schools are those designed to assist the forces afloat by giving such elementary instruction to recruits as will make them more immediately useful and give them the groundwork necessary for the lowest petty-officer ratings.

These are the only schools to which men are eligible on completion of recruit training, and before going to sea, except the stenography, Diesel, and submarine schools, to which qualified recruits may be assigned to complete the quota if not filled by the fleet.

Class-B schools are those designed to supplement the training afloat by giving enlisted men advanced instruction when such instruction can be more advantageously given ashore.

Men are sent to these schools from the ships of the fleet and on completion of the course are usually returned to the ships from which received.

Class-C schools are those designed to meet the needs of the service by giving advanced training for particular duty assignments to enlisted men in special subjects not normally a part of shipboard instruction.

GENERAL REQUIREMENTS FOR ENTRY TO SERVICE SCHOOLS

The general requirements for entry in any service school are:

(1) Detail to school should be desired by the man concerned.

(2) He must have a good record.

(3) He must have shown aptitude for the specialty represented by the school.

(4) Except in the case of a candidate for the Officers Cooks' and Officers Stewards' School, he must have a mark not lower than 50 on the Bureau of Navigation Standard Test in Arithmetic. Candidates for the Officers Cooks' and Officers Stewards' School must have a mark not lower than 25 on this test.

(5) He must be able to read, spell, and write English with a fair degree of ability, and, in general, possess the equivalent of a grammar school education.

(6) A mark of at least 70 in the general classification test, except in the case of a candidate for the Officers Cooks' and Officers Stewards'

School, who shall have a General Classification Test mark of at least 50.

(7) He shall not have attended any other service school during current enlistment, except that a graduate of an elementary school (class-A) may attend one advanced school (class-B) or one special school (class-C) during the same enlistment; also a graduate of an advanced school (class-B) may attend one special school (class-C) during the same enlistment.

(8) A statement signed by the man concerned that no reasons exist nor can any be foreseen that will necessitate a request for a special order discharge must be filed with his record.

(9) There shall be at least two years remaining to serve on his current enlistment or enlistment as extended at date of completion of the course.

APPOINTMENT OF ENLISTED MEN TO NAVAL ACADEMY

The law authorizes the appointment of 100 midshipmen annually from the enlisted personnel of the Navy and Marine Corps. The men are first required to take a preliminary examination to determine their qualifications and, if found satisfactory, are then sent to the Naval Academy preparatory class for further preparation for the regular Naval Academy entrance examinations. The 100 men who stand highest in these entrance examinations and who make a passing mark in each subject will be appointed midshipmen.

The following are the qualifications necessary for enlisted men to become midshipmen:

(1) Be of officer caliber.

(2) Be a citizen of the United States.

(3) Have had 9 months' sea duty in a ship in full commission by the date of his final transfer to the Naval Academy. Duty in aircraft designated as fleet aircraft may be counted as sea duty in a ship in full commission.

(4) Be not less than 16 or more than 21 years of age on April 1 of the calendar year in which the examination is held.

(5) Must have completed high school course in at least five of the following subjects: Algebra, Geometry, Chemistry, Physics, U.S. History, and English.

(6) Be able to pass the required examination.

PROMOTION TO WARRANT RANK

The qualifications necessary for promotion to warrant rank are as follows:

(1) Must be under 35 years of age on date of appointment.

(2) The average mark in *proficiency of rating* as shown by his service record, excluding the marks assigned during his first year of service, is not less than 3.4 on a scale of 4.0.

(3) Must be able to read and write English with facility, understand the first four rules of arithmetic and proportion, be able to keep a correct account of stores, and be thoroughly conversant with all instructions and regulations pertaining to the duties of the grade for which he is to be examined.

(4) Must be able to pass the required professional examination.

(5) Must be serving under continuous service as a chief petty officer or petty officer, first class, have not less than 5 years' sea service, and at least 1 year must have been served in the rating of chief petty officer or petty officer, first class. In the case of promotion to machinist, pharmacist, or pay clerk, the candidate must be a chief petty officer, though an exception is sometimes made in the case of machinists.

PROMOTION TO COMMISSIONED RANK

Warrant officers, including chief warrant officers, within the age limit of 35 years, who have served not less than 4 years as warrant officers and who pass a satisfactory examination, may obtain commissions in the line of the Navy.

PAY GRADES

The following is the distribution of all ratings to the 8 pay grades in our Navy, with the base pay of each grade.

Grade	Pay per month	Class or rating
1	$126.00	Chief petty officers (permanent).
1-A	99.00	Chief petty officers (acting).
2	84.00	Petty officers, first class; officers' stewards and cooks, first class.
3	72.00	Petty officers, second class; officers' stewards and cooks, second class; musicians, first class.
4	60.00	Petty officers, third class; firemen, first class; officers' stewards and cooks, third class.
5	54.00	Nonrated men, first class (except firemen, first class, and musicians, first class); firemen, second class; musicians, second class; mess attendants, first class.
6	36.00	Nonrated men, second class (except firemen, second class, and musicians, second class); firemen, third class; mess attendants, second class.
7	30.00	Nonrated men, third class (except firemen, third class); mess attendants, third class (except monthly base pay of enlisted

men with less than four months' service during first enlistment period is $21).

THE FUTURE THE NAVY HAS TO OFFER

The Navy offers a young man who wants to make good a real future. There is not a place in civil life that can compare with the Navy in this respect. Here are a few of the opportunities that the Navy offers you:

(1) Fine courses of training in practically every profession.

(2) A clean, wholesome, and honorable position in life.

(3) Plenty of leave and liberty and every facility for recreation. No place in civil life can offer you anything to compare with this.

(4) Rapid promotion to men who study and work. In 5 or 6 years a good man can rise to the higher pay grades.

(5) Higher pay in shorter time than can be obtained anywhere else.

(6) Excellent opportunities to reach warrant and commissioned ranks. Either of these ranks carries with them privileges, honor, and responsibilities not surpassed by any of the big professions in civil life.

(7) Free medical, dental, and hospital facilities to all service men. Free medical services to your family. Full pay as long as you are sick, provided this sickness is not due to your own misconduct. In civil life sickness means large doctor bills and usually a stoppage of pay.

(8) A permanent job. You can be discharged only by a sentence of a court-martial after your first enlistment, except under unusual circumstances, and then only when your offense has been of a very serious nature. In civil life a dull period, a run-in with the boss, or any one of a dozen insignificant reasons can cost you your job.

(9) A fine opportunity to see the world. No man who has spent several cruises in the Navy has failed to see a large part of the world.

(10) Pensions, hospitalization, and medical treatment for men who have been injured in line of duty.

(11) Transfer to the Fleet Naval Reserve after 20 years' service, with liberal regular pay, followed by retirement on good pay after 30 years' service.

(12) The facilities of the naval dispensaries and Navy Relief, in case your family needs help. Cheap government insurance is also available.

CONCLUSION

You will all hear a lot of grumbling from men about you. To grumble is human. Men grumble because they are served turkey in place of

goose, or vice versa. Grumbling is as necessary to most men as fleas are to a dog. A reasonable amount is good for both of them, as it keeps them interested in life. It is the almost invariable rule that men who grumble mean nothing by it. Too much grumbling, however, will get any man in wrong in time, and it is best to limit this art to what is necessary for the man's pleasure in life.

A cheerful disposition, a helpful hand, a willingness to work, a will to study, and a willingness to get ahead in life will insure any man's success in our Navy. Aim for a commission from the time you enter the training station. You may not make it, but you are sure to get closer to it than you would have done if you had not aimed at all. The Navy always has sufficient room on the top for the good men. It is only the nonrated grades that are kept filled. Determine now that from this day on you will make good. The Navy wants the trained man. It wants to help a man who wants to get ahead, and it is always glad to give a higher rating, a higher pay, and a higher respect for that type of man.

CHAPTER 17

REPORTING FOR DUTY ABOARD SHIP

GENERAL INSTRUCTIONS

THESE instructions are to give you an idea of how you will be taken care of on board ship and to advise you how to take better care of yourself.

A draft will be made up at the training station of men who have completed their training. This draft, under command of competent petty officers, who will carry your records, pay accounts, and transfer papers, will be sent to report to the senior officer present of the ships to which this draft is assigned. Each man in the draft will carry his own bag and hammock, the hammock being placed closely around the bag and both lashed securely together so as to make one bundle of the two.

The whole draft is usually taken aboard the flagship or senior officer's ship. You will be instructed to fall in ranks with your bag and hammock with you. Now will come a tedious period of waiting. The petty officer in charge of you will report to the officer of the deck, who will order him to report with your records, etc., to the senior officer present or his representative. The senior officer will then assign a certain number of you to each ship under him. It takes considerable time to sort out your papers and get proper records of your transfer, especially if you are in a large draft. As soon as the proper papers are made out, you will be mustered into groups as assigned to each ship. By this time the senior officer has notified each ship concerned to send a boat to the flagship to receive its draft. You will now be sent to your future home.

When you get aboard, the officer of the deck will have you fall in again as you did on the flagship. He will muster you and then send your records, etc., to the executive officer. Again you will have to wait until the executive officer can assign you to proper divisions aboard ship and get your papers straightened out. In many cases the heads of departments on board ship, such as the navigator, gunnery officer, engineer officer, and first lieutenant, will inspect your records and then look you over in order to find someone especially fitted for particular jobs in their respective departments. Naturally, you who have the

best records will receive the most consideration. Some few of you are almost certain to be picked out here for the electrical division, plotting room, or other important division for at least a try-out. You may be given a chance to say whether you want the engineer or the deck divisions. If possible, you will be assigned according to your wishes, but this is not always possible, as the vacancies must be filled in each division, and it may happen that there are more vacancies in one division than men in the draft volunteer for. You will now be mustered into groups according to the division to which you have been assigned. Your division officer will inspect you and then detail one of his petty officers to show you your part of the ship.

On large ships, especially battleships, when a fairly large draft comes aboard, it may be formed into a special division, called "division X," and kept in this division for one month. You are assigned special quarters and live more or less apart from the rest of the crew. You will have a special officer and several of the ship's best petty officers over you during this time. This month's special training is given you so that you can have more time, more direct supervision, and a better opportunity to learn about your future home and how to carry on aboard it.

You will be shown how to swing your hammock and stow your clothes. Then you will be shown the head and washrooms and told how to keep your clothes and person clean. Then you will be given instruction in ship's routine and how you carry on a day's work aboard ship. Your drill periods will be taken up in learning every part of the ship. You will go into every department, and everything will be explained to you. They will tell you about the ship's organization, her captain, her executive officer, her heads of departments, and her division officers. You will be told about the emergency drills, general quarters, fire drill, abandon ship, fire and rescue party, and collision drill, and all the different alarms sounded for these drills. By the end of the month you will know your new home quite well and will know how to live in it. This first month aboard is the hardest month of all. You feel completely lost—we all did. It is almost, you think, as bad as the detention period, but it is not. You get liberty, and, what is more, you soon get on to the life and you begin to like it at once.

At the end of this month, or, if you were in a small draft and were not put in division X, you are assigned to divisions. Your division petty officer will show you where to hang your bag, stow your hammock, swing your hammock, where you eat, and, in general, the same as ex-

plained for division X. You will start mingling with your new shipmates and your "troubles" will begin. Every one of your shipmates, especially those who have just "learned the ropes" themselves, will start having a lot of fun with you. They will send you after "hammock ladders," tell you to wind the "anchor watch," and thousands of similar jack-tar jokes. You will have to stand this good-natured hazing, for you cannot stop it amongst these live youngsters. It is similar to what you would have to stand as a freshman if you entered a college. Grin and bear it. A few months hence you can try it on the next draft yourself.

Owing to the natural skylarking tendency of your young shipmates, it is far better that you ask whatever information you want from your petty officers. They know how to give it to you, and will gladly give you the information you want.

Your division officer will make out your proper station bill and will have a petty officer explain it carefully to you. Again, you must remember that your best friends are your officers and your petty officers. Go to them for help, watch them, and imitate them.

You will soon be deep in your division duties, and with work, drills, liberty, movies, athletics, happy hours, target practices, and cruising you will never be lonesome or unhappy. You are starting up the ladder. To get up you must study and work hard. You have fine training courses to study, which are issued to you free of charge. Your officers and petty officers are anxious to help you in them. Everything is ready to make it easy for you to get ahead. With energy and ambition on your part your future is bright. If you do not get ahead in the long run, you will have to blame chiefly yourself.

PART TWO

SUBJECTS ALL ENLISTED MEN SHOULD KNOW

A to N

CHAPTER 18

A—DISCIPLINE AND DUTY

The twofold nature of duty in the Navy 131
The importance of accurate knowledge 132
Discipline 132
The nature of an order and of a command 133
Security of information 134

THE TWOFOLD NATURE OF DUTY IN THE NAVY

WHEN a man enlists in the Navy, no matter in what rating, the nature of his duties is twofold. The duties: (1) *his military duties,* and (2) *the special duties of the rating in which he enlists.*

(1) Military duties.—It cannot be too strongly impressed upon every enlisted man, whatever his length of service and whatever his rating, that, entirely apart from the duties of that rating, he has certain duties of a military nature by virtue of the mere fact that he is in a military service. Though his ordinary duties may be such as to reduce the amount of his military duties (for example, to lessen the amount of drill), nevertheless, the military side of the profession is always present, and its responsibilities are always in evidence. However expert a fireman, machinist, yeoman, or cook may be, he must realize the fact that when he enlists in the Navy the greatest difference between service life and civil life is that in the Navy skill in his rating constitutes only a part of his duty. Your performance of duty at your general quarters station is your big job. This work must be done perfectly every time you take this station. The battle efficiency of your ship depends on the action of each man in the ship. You may think your position is a small one but every man's job is small compared to the ship as a whole. Yet every man is of the utmost importance. Learn every detail of your duties at general quarters, and practice doing these duties perfectly every time you go to this station.

(2) Special duties.—The special duties of your rating come after your military duties; however, you must work and study hard to become expert in them and to deserve promotion. You cannot expect advancement without effort on your part. If you do only what you are told to do, if you do not try to improve yourself by hard study and effort, you can never expect to get ahead in your profession. No

man can stay at the top of his form without continuous effort on his part. As soon as he stops his efforts to keep on improving himself he gets into the well-known rut which steers him on a down grade to failure.

THE IMPORTANCE OF ACCURATE KNOWLEDGE

Accurate knowledge is necessary if you are to succeed in any job. Without accurate knowledge you waste time, bungle the job, and give everyone the impression that you are incompetent or worthless. Many of you have probably tried to overhaul an auto for the first time and without knowing much about it. If you have, you probably remember how long it took you, how greasy and dirty you got, how hard it was to put parts together, and how unsatisfactory the whole job was. You have also seen how a man who knew his job could take this same car, and in a short time, without getting particularly greasy or dirty, overhaul and put the car in fine shape. This is due to the man's having *accurate knowledge* of his job. *Such knowledge* can be obtained by every man on board ship. There are training courses for each rating, issued free of charge to everyone. Use them. Do not try to learn by hard knocks and experience alone. That is slow and inefficient. The study of a good textbook for a few hours will probably teach you more electricity than Franklin learned in his whole life. In one month of study and practice you can learn more about your rating than you learn in two years of "doing just what you are told," and no more.

DISCIPLINE

Discipline teaches a man to do cheerfully, and without question, what he is told to do, to follow his leader and to obey. A man has fine discipline when he gives instant and willing obedience to all orders, and, in the absence of orders, does what he believes the order would have been, had he received one. Discipline does not mean curtailed liberties, restrictions of personal conduct, and forced obedience to all sorts of rules and regulations. It means, rather, self-control, a cheerful obedience to necessary laws and regulations, and a square deal to your fellow-man. By self-discipline you gain power to be a leader among men. Through discipline you wield a strong, unified power that means success in emergencies. Without discipline a ship's company is but a disorganized mass of men. With discipline, it is a mighty fighting force. You must learn discipline, as you would learn

a trade. It is the most important part of your most important duties—your military duties.

Rules of discipline.—(1) Obey orders cheerfully and willingly.

(2) Obey the last order received from any responsible senior.

(3) Show respect to your seniors at all times.

Questions on discipline.—Q. What is meant by obedience to orders?

A. It is a prompt, ready, zealous, and complete compliance with orders given. A slow, unwilling, partial compliance with orders is as bad as flat disobedience, and in such cases a guilty person should be reported.

Q. What is the first principle of discipline?

A. A prompt obedience to the orders of superiors.

Q. How is this obtained and enforced?

A. While it is often necessary to have recourse to punishment for those who deliberately violate orders, it must not be supposed that discipline and punishment go hand in hand and that one is dependent on the other. Discipline is obtained by a constant attention to the minor details of life on board ship; by requiring an absolute compliance with the details of all drills and evolutions, correcting, and, if necessary, reporting every infraction of the regulations.

Q. Next to a strict obedience to orders, what always marks a well-disciplined ship's company?

A. Quickness of movement and complete absence of noise, confusion, and "singing out."

Q. What language is always improper on board ship?

A. Profane, abusive, obscene, loud, boisterous language and noises, disturbances, or confusion of any kind.

THE NATURE OF AN ORDER AND OF A COMMAND

It is necessary to understand the difference between an *order* and a *command*.

When an officer gives a man an *order* to perform a certain task, the officer considers that the man has intelligence and initiative. He gives an order in such a way that the man is allowed some discretion in the manner in which the details of the order will be executed.

But when an officer gives a man a *command*, the man is directed to perform a certain act in a certain definite way. The man is allowed no discretion in the manner in which the details will be executed.

An *order* contains no details of the way a task shall be accomplished, but a *command* does.

SECURITY OF INFORMATION

The enlisted personnel of the Navy are frequently made the target of agents acting to obtain information concerning the Navy in general and the activities of the fleet. For the protection and safety of yourself, your shipmates, and your country, great care and caution should be exercised in guarding your speech and conversation with civilians ashore. The most innocent acting and appearing person may be the one who is relaying information picked up from your conversation.

Make it a rule not to talk "shop" when away from your ship.

CHAPTER 19

B—WHAT THE SERVICE OFFERS

General 135
Liberty 135
Leave 136
Shore duty 136
Re-enlistments 137
Permanent appointments for chief petty officers 138
The ship as a training school 138
Advancement in rating 139
Appointments to petty officer ratings 141
Retirement 142
Medals and rewards 142
Citizenship 144
Examining boards and examinations 144

GENERAL

AFTER a man has mastered the general military details of the profession, the Navy holds forth a number of different specialties with excellent opportunities for instruction and training therein. Early in his enlistment it will pay every man to decide for which of these numerous branches he deems himself best fitted, constantly bearing in mind the fact that, irrespective of his rating, he must be first, a man-of-war's man, and second, a specialist in his own particular rating.

Application and industry in any of the Navy branches, combined with absolute obedience and strict compliance with the rules of military discipline, cannot fail to win for the intelligent man promotion to the rating of chief petty officer. Having attained this rating, men of ambition and ability are often promoted to the rank of warrant officer, and every opportunity is given the warrant officer to fit himself for a commission.

Service schools and requirements for entry—See page 120.

Appointment of enlisted men to the Naval Academy—See page 121.

Promotion to warrant and commissioned rank—See pages 121-122.

LIBERTY

Authorized absence from duty for less than 48 hours is considered as "liberty."

Unless the exigencies of the service or the unhealthfulness of the port prevent, no person is deprived of liberty on shore for more than 12 days, unless he be confined by sentence of court-martial, or under arrest for trial, or his usual conduct on shore is discreditable to the service.

Liberty is not granted to men who have venereal diseases except as provided in general orders.

LEAVE

Authorized absence from duty for more than 48 hours is considered as "leave."

Commanders in chief, senior officers present, and commanding officers are authorized to grant leave of absence to enlisted men whose services can be spared, not to exceed 30 days, exclusive of travel time, in any one calendar year. In cases of emergency, additional leave may be granted at discretion. In general, leave is so distributed throughout the year as to maintain the available force at a maximum when most needed.

Applications by men on leave for an extension of leave must be addressed to their commanding officers and not to the Navy Department.

All men who are discharged by reason of expiration of enlistment, and who re-enlist within 30 days from date of discharge, may be granted 30 days' leave exclusive of travel time.

Charges for medical and dental expenses are allowed only when the enlisted man concerned is in a duty status at the time such expenses were incurred and only when proper Navy medical attendance is not available. It is also necessary that the man concerned or his commanding officer report the case promptly as required by the *Navy Regulations*. It will thus be apparent that personnel on leave are entitled to incur no expenses for medicines or medical attendance that may be made the basis of a claim against the Navy Department.

SHORE DUTY

Except in certain ratings, a man is not assigned to shore duty unless he has been in the service 6 years or has completed 6 years' duty on seagoing vessels since last tour of shore duty. The periods of 6 years mentioned must be in continuous service.

The exceptions mentioned are those ratings where the number of

shore billets to be filled bears a greater proportion to those at sea than as 1 to 3. The Bureau issues instructions with regard to those excepted ratings from time to time.

In determining eligibility for shore duty in the United States, service on shore beyond the seas, when combined with 2 or more years of sea duty, will be credited as duty on seagoing vessels.

The term of shore duty is 2 years except in certain ratings.

Where practicable, men are sent to shore duty in localities requested by them.

When the Bureau has approved the official request for shore duty, the man will be transferred to that duty when a vacancy exists, with due consideration given to the date of his request, length of service, rating, availability, and the character of duty to be performed on shore.

RE-ENLISTMENTS

Continuous-service men.—Men are re-enlisted under continuous service for periods of 4 to 6 years only, at the option of the men concerned.

Men holding permanent appointments as chief petty officers, re-enlisting under continuous service, are re-enlisted in the rating held at discharge. Petty officers, first, second, and third class, and nonrated men are re-enlisted in the rating held at discharge. Men discharged with acting appointments as chief petty officers, re-enlisting under continuous service, are re-enlisted in the next lower rating and immediately issued a renewal of the acting appointment held at the date of discharge.

No man is re-enlisted at sea. If the enlistment of a man who has indicated his intention of re-enlisting immediately on board expires while at sea, he will be detained until arrival at the next port, when he will be discharged, and, if qualified, re-enlisted.

Broken service.—Enlistment of broken-service men is subject to instructions issued by the Bureau of Navigation. Normally, in peace time, it is the policy not to accept broken-service men without authority of the Bureau of Navigation.

Special order or medical survey discharges.—Men discharged by special order or by medical survey will not be permitted to re-enlist.

Re-enlistment of married men.—Men in pay grades 5, 6, and 7, who are married, may be re-enlisted in the Navy or permitted to extend their current enlistment, at the discretion of the commanding officer: PROVIDED, *(a)* No valid complaints have been made against the man

for nonpayment of debts; *(b)* no valid complaints have been made against the man for nonsupport of wife and child (children), if any; *(c)* an adequate allotment is registered for support of wife and child (children), if any; *(d)* the man is considered desirable material for retention in the naval service.

PERMANENT APPOINTMENTS FOR CHIEF PETTY OFFICERS

Permanent appointments are issued by the Bureau of Navigation to chief petty officers when recommended by their commanding officers.

Before being recommended for a permanent appointment a chief petty officer must:

(1) Have served 1 year in the rating on vessels not attached to a shore station, as a member of the personnel of rigid airships, in the field with marines beyond the continental limits of the United States, or, in the case of aviation ratings, with an aviation detachment or unit assigned to the forces afloat.

(2) Have no mark less than 3.5 in any subject except marksmanship, for 1 year.

Permanent appointments are issued to protect chief petty officers in their rating, and may not be revoked by the commanding officer. Should a man holding a permanent appointment prove not qualified to perform properly the duties of his rating, full report of the circumstances should be made to the Bureau of Navigation.

The effective date of permanent appointment is determined by the Bureau of Navigation and is stated on the face of the appointment. The appointment is delivered to the man at quarters. It is his property, but may be kept with his service record or continuous service certificate if he so desires.

Failure to receive an honorable discharge or to re-enlist within 3 months from date of honorable discharge cancels a permanent appointment.

Men discharged with permanent appointments and re-enlisting under continuous service shall be re-enlisted in the rating held at date of discharge.

THE SHIP AS A TRAINING SCHOOL

Most of the petty officers in the Navy have been trained and promoted on board ship. The trade schools train only a few of them. Except in a few high ratings, your ship offers you the same opportunities for promotion whether you have graduated from a trade school

or not. But to be promoted you must work and study. You must study the training courses supplied you by the Bureau of Navigation and do your work well.

Obedience, of course, is necessary for promotion whether you go to a trade school or stay aboard ship.

ADVANCEMENT IN RATING

General.—Before a man may be advanced to the next higher rating he must:

(1) Meet certain requirements as to length of service which varies for different "pay grades";

(2) Meet certain requirements as to marks in proficiency in rating and conduct;

(3) Have completed satisfactorily the Navy training course, where a suitable one is available, for rating to which the candidate is eligible for advancement;

(4) Have completed satisfactorily the course at a service school when required;

(5) Qualify in the practical factors that are prescribed for his rating.

(6) Pass satisfactorily a technical examination;

(7) Be recommended by his commanding officer; and

(8) The Bureau of Navigation must have authorized advancements to the rating in question.

When authorized.—(1) Commanding officers are authorized to advance apprentice seamen to seamen, second class, without regard to vacancies in allowance, and to firemen, third class, to fill actual vacancies in the fireman group allowance, on completion of 4 months' service. Apprentice seamen under instruction at the machinist's mate, artificer, electrical, and aviation elementary schools may be advanced to firemen, third class, on completion of 4 months' service.

(2) Commanding officers are authorized to advance men to other nonrated grades, in accordance with instructions of the Bureau of Navigation.

(3) From time to time the Bureau of Navigation issues instructions to the service as to method of advancing men in rating or for recommending men to the Bureau for advancement to all petty-officer ratings.

Necessity of good record.—A good record implies that you are obedient. As explained before, obedience makes a ship a fighting power. A lack of obedience on your part, such as disobedience to

orders or disrespect for your senior, will get you on the report. All reports are placed in your service record, and your record is closely scrutinized by every examining board before which you may appear. No one without a good record can be promoted. Besides, a good record shows that you are trustworthy. If you should get into trouble, a previous good record will always help you or make your punishment less severe. A good record will insure your getting special consideration at all times.

Qualifications in marks.—Men are qualified for advancement in their rating when they fulfill the requirements in marks as prescribed below:

To—	Proficiency in rating	Conduct
Seaman, second class....	No requirements as to marks.	No requirements as to marks.
Fireman, third class....	do.	do.
Other nonrated grades except officers' stewards and cooks.	No mark less than 2.5 for preceding 6 months and not less than 3.5 for quarter preceding advancement.	No mark less than 2.5 and an average of not less than 3.5 for 6 months.
Officers' stewards and cooks.	No mark less than 2.5 for preceding 12 months and not less than 3.5 for quarter preceding advancement.	No mark less than 3 and an average of not less than 3.5 for 1 year.
Lowest petty-officer rating from nonrated grades.	do.	do.
Petty officer, second class, from third class.	No mark less than 3 and an average of not less than 3.5 for 1 year.	do.
Petty officer, first class...	do.	do.
Chief petty officer.....	No mark less than 3 and an average of not less than 3.5 for 2 years.	No mark less than 3 and an average of not less than 3.5 for 2 years.

Service qualifications.—Men are normally qualified for examination for advancement in rating when they fulfill the requirements of service as provided below (These requirements may be changed during emergencies):

From Pay Grade	To Pay Grade	Service
(*a*) Normal		
7	6	4 months' naval service.
6	5	6 months in lower rating.
5	4	6 months in lower rating.
4	3	12 months in lower rating.
3	2	12 months in lower rating.
2	1A	36 months in lower rating, 12 of which must be at sea.
1A	1	12 months' sea service as defined in D-5106 (2), *Bunav Manual*, with acting appointment.
(*b*) Exceptions		
7 M.Att. 3c to M.Att. 2c.	6	12 months' naval service.
6 M.Att. 2c to M.Att. 1c.	5	12 months in lower rating.
5 M.Att. 1c to Off.Std. 3c or Off.Ck. 3c.	4	12 months in lower rating.
6 or 5. To F.C. 3c, E.M. 3c, R.M. 3c, C.M. 3c, S.F. 3c, Prtr. 3c, Ptr. 3c, Y. 3c, S.K. 3c, S.C. 3c, Bkr. 3c, and all aviation ratings third class.	4	16 months' naval service.
6, 5, or 4. To Bmkr. 2c, Mldr. 2c and Msmth. 2c.	3	28 months' naval service.
5 Mus. 2c to Mus. 1c and Bug. 1c to Bgmstr. 2c.	3	28 months' naval service.
6 Sea. 2c to Sea. 1c.	5	6 months in pay grade 6.
6 F. 3c to F. 2c.	5	6 months in pay grade 6.

APPOINTMENTS TO PETTY OFFICER RATINGS

When a man is selected for the position of a petty officer, either from an eligibility list in the Bureau or otherwise, and the necessary authority to advance him has been given in accordance with current instructions, the commanding officer issues to him an appointment. This appointment may be revoked at any time by the commanding officer of the ship on board which he may be serving should the petty officer prove not qualified for the position he may be holding.

An entry is made in the service record of all appointments issued, renewed, or canceled.

RETIREMENT

The application of enlisted men of the Navy for retirement is made to the President of the United States, via official channels. Applications for such retirement may be submitted by men who have completed 30 years' service.

Upon being retired they shall receive 75 per cent of the pay which they were receiving at the date of retirement, plus monthly allowances.

The authorized pay and allowances of retired enlisted men are paid them monthly by the Bureau of Supplies and Accounts or by the disbursing officer of the Naval Station, Cavite, P.I., for retired men residing in the Philippine Islands or China.

Retired men are required to keep the commandant of the district in which they reside informed of any change of address.

They may be recalled to active service in time of war or when, in the opinion of the President, a national emergency exists.

They are entitled to medical treatment and hospitalization.

Retirement pay.—Pay on retirement after 30 years' service is as follows: seaman, $66.38 per month; petty officer, first class, $94.50 per month; chief petty officer, $133.88 per month.

MEDALS AND REWARDS

Medal of honor.—The President is authorized to present, in the name of Congress, a *medal of honor* to any person who, while in the naval service of the United States, shall, in action involving actual conflict with the enemy, distinguish himself conspicuously by gallantry and intrepidity at the risk of his life above and beyond the call of duty and without detriment to the mission of his command or to the command to which attached.

Distinguished-service medal.—The President is authorized to present, but not in the name of Congress, a *distinguished-service medal* of appropriate design and a ribbon, together with a rosette or other device to be worn in lieu thereof, to any person who, while in the naval service of the United States subsequent to the sixth day of April, 1917, distinguishes himself by exceptionally meritorious service to the government in a duty of great responsibility.

Navy cross.—The President is authorized to present, but not in the name of Congress, a *Navy cross* of appropriate design and a ribbon, together with a rosette or other device to be worn in lieu thereof, to any person who, while in the naval service of the United States subsequent to the sixth day of April, 1917, distinguishes himself by

extraordinary heroism or distinguished service in the line of his profession, such heroism or service not being sufficient to justify the award of a medal of honor or a distinguished-service medal.

The distinguished flying cross is awarded to any person who, while serving in any capacity with the Air Corps of the Army of the United States, including the National Guard and Organized Reserves, or with the United States Navy subsequent to April 6, 1917, has distinguished himself by heroism or extraordinary achievement while participating in an aërial flight.

Additional pay for medals.—Each enlisted or enrolled person of the naval service to whom is awarded a medal of honor, distinguished-service medal, distinguished flying cross, or a Navy cross shall be entitled to additional pay for each such award at the rate of $2.00 per month from the date of the distinguished act or service on which the award is based, and each bar or other suitable emblem or insignia, in lieu of a medal of honor, distinguished-service medal, or Navy cross shall entitle him to further additional pay at the rate of $2.00 per month from the date of the distinguished act or service for which the bar is awarded, and such additional pay continues throughout his active service, whether such service is or is not continuous.

No more than 1 medal of honor or 1 distinguished-service medal or 1 Navy cross is issued to any one person; but for each succeeding deed or service sufficient to justify the award of a medal of honor or a distinguished-service medal or Navy cross, respectively, the President may award a suitable bar or other suitable emblem or insignia to be worn with the decoration and the corresponding rosette or other device.

Life-saving medals may be awarded to persons in the naval service by the Secretary of the Treasury on the recommendation of the Secretary of the Navy.

Good-conduct medals and pins will be issued by the Bureau of Navigation. A medal will be issued as the first award to an individual and a pin for each subsequent award. An enlisted man shall not be deprived of a good-conduct medal or pin except by conviction for an offense committed in a prior enlistment in which a good-conduct medal or pin had been previously held to have been earned but not bestowed. Men with clear records (no offense or qualifying remarks entered in service record) and with a final average of 3.5 in proficiency in rating are eligible to receive good-conduct awards.

Manner of presentation.—The medal of honor will be presented by the president or, if such is impracticable, by the Secretary of the Navy

as his personal representative. The recipient will be ordered to Washington for the presentation if within a reasonable distance; if not, the medal of honor will be presented by the senior officer present, with appropriate ceremonies.

The distinguished-service medal, Navy cross, and distinguished flying cross will be presented by the Secretary of the Navy in cases of persons located in or near Washington, D.C. When the presentation occurs outside the city of Washington, it will be made by the senior officer present or unit commander designated by him unless the Secretary of the Navy, the Assistant Secretary of the Navy, or the Chief of Naval Operations is present, when it will be made by him. If the presentation occurs within a naval command, it will be made with appropriate ceremony.

CITIZENSHIP

The advantages of being a citizen of the United States are numerous and volumes have been written expounding thereon. Citizenship means that the power of the country is behind you, that you may apply for assistance or information when in a foreign country, or, in other words, providing you are a citizen, you always have somebody from "back home" to whom to tell your story. Being in the Navy you are, of course, a citizen of the United States or a native of one of the insular possessions.

A man who is convicted for deserting the naval service of the United States in time of war loses his citizenship rights and forever is incapable of holding any office of trust or profit in the United States or of exercising any rights of a citizen thereof.

NAVAL RESERVE (See Chap. 57)

EXAMINING BOARDS AND EXAMINATIONS

The examining boards for all ratings below that of chief petty officer consist of 3 officers, at least 1 of whom shall have had at least 2 years' service in the regular Navy.

The examining board for chief petty-officer ratings consists of 3 officers not below the rank of lieutenant (junior grade), at least 1 of whom must be not below that of a lieutenant.

When men on detached duty become eligible for advancement and there is not a sufficient number of officers available to organize an examining board, commanding officers may authorize such men to report at their own expense to any near-by station or ship for the purpose of being examined for advancement.

The *Bureau of Navigation Manual* prescribes the subjects in which the men of each rating must be examined. Subjects A to N, found in this *Manual,* are a part of all examinations up to and including lowest petty-officer ratings. Any man who is to appear before an examining board for examination for promotion should get a list of the subjects from his division officer. Rating courses and training courses for his rating will ordinarily cover all subjects which may be asked by the examining board.

In order to be recommended for advancement by the examining board, a candidate must receive a mark of at least 2.5 in each subject. When this mark is assigned by averaging several subjects, a man must not be recommended who has received a mark less than 2.5 in any one subject.

CHAPTER 20

C—ENLISTMENTS, DISCHARGES, COURTS-MARTIAL

First enlistments 146
Extension of enlistments 147
Re-enlistments 147
Discharges 148
Proficiency in rating and conduct 150
Advantage of honorable discharge 152
Transportation after discharge 152
Service records 153
Overstaying liberty 154
Desertion 156
Naval courts-martial 157
Punishments by commanding officer 158

FIRST ENLISTMENTS

FIRST enlistments in the Navy are made only at Navy recruiting stations. Applicants for first enlistment must be:

Native-born or fully naturalized citizens of the United States or natives of its insular possessions;

Not less than 17 years of age when enlisted;

Under 25 years of age when enlisted;

Of good character;

Mentally qualified;

Not less than 63 inches in height if under 21 years of age; and not less than 64 inches in height if 21 or over;

Of proportionate weight to age and height;

Unmarried.

They must also:

Pass a rigid physical examination;

Qualify in a general classification test;

Have no dependents;

Furnish authentic evidence of age;

Secure written consent of parent or guardian if under 21 years of age;

Furnish list of former employers, or school teachers, or references from at least two responsible persons;

Have no police record (except minor infractions not involving moral turpitude);

Have no juvenile court, reform school, or prison record.

Applicants who are 18 years of age or over are enlisted for 6 years.

First enlistments are authorized only in the rating of apprentice seaman at a monthly base pay of $21.

All enlistments are made for general service. No promise or assurance can ever be given an applicant that he will be assigned to any particular detail or duty.

As soon after enlistment as practicable, apprentice seamen are transferred to a training station. The large training stations are at Hampton Roads, Va.; Newport, R.I.; San Diego, Calif.; and Great Lakes, North Chicago, Ill. At the termination of the period of instruction at the training station, apprentice seamen are transferred to cruising ships.

EXTENSION OF ENLISTMENTS

The terms of enlistment of a man may, by his voluntary written agreement, be extended for 3 or 4 full years from date of expiration of his then existing term of enlistment. Enlistments may be extended for 1 year only for purpose of transfer to Fleet Naval Reserve. Enlistments may be extended for 2 years in case of men completing first enlistment. Filipinos on duty on the Asiatic station are not permitted to extend enlistment for less than 3 years.

No more than one extension of any duration after any single enlistment will be permitted without authority of the Bureau of Navigation.

The commanding officer is authorized to cancel an extension agreement at any time prior to the date the extension term begins to run, provided the man's conduct warrants that action.

The same physical examination is required for extension of enlistments as for re-enlistments.

Generally a man is not permitted to extend his enlistment until about the completion of the original term of his enlistment. For certain purposes, however, such as qualifying for a foreign cruise or for entrance to a service school, it may be necessary in some cases to authorize extensions a considerable time in advance.

RE-ENLISTMENTS

Men who have been discharged under honorable conditions recommended for re-enlistment may be re-enlisted within 3 months of the date of discharge only on the ship or station from which discharged, on receiving ships, or at receiving stations or recruiting stations, provided they are physically qualified. The cases of men discharged as the result

of disciplinary action are referred to the Bureau of Navigation for action.

DISCHARGES

The six classes of discharges, with their conditions, are as follows:

Class-A.—Discharges by reason of expiration of enlistment:

Character of service	Conditions
Honorable	(1) Discharged at expiration of enlistment or within 3 months prior to that date, if for the convenience of the government. (2) In computing the final marks to be entered in a man's service record on his certificate of discharge or continuous service certificate or in computing the average required to receive an honorable discharge, the first year of a man's service on a first enlistment will be disregarded. Men discharged at the expiration of a first enlistment, of 4 or 6 years, the last 3 or 5 years of service will be used in computing the final average. Men serving on a first enlistment which has been extended for 1, 2, 3, or 4 years, the marks for the last 4, 5, 6, or 7 years of service will be used in computing the final average upon discharge. In computing the final average on re-enlisted men or a re-enlistment which has been extended, the service for the entire enlistment and extension will be used in computing the final average upon discharge. To be eligible to receive an honorable discharge at expiration of enlistment, a man must attain a final average of 2.75 in proficiency in rating and 3 in conduct. (3) Never convicted by general court-martial nor more than once by summary court-martial, unless this requirement be waived by the Bureau of Navigation upon recommendation of commanding officer, based on extenuating circumstances or exceptional conduct subsequent to the court-martial.
Good	(1) Same as (1) above. (2) Average of marks as computed above less than those required for an honorable discharge, but not less than 2.5 in proficiency in rating, and 2.75 in conduct. (3) Recommended for re-enlistment.
Indifferent	(1) Same as (1) above. (2) Average of marks as computed above less than 2.5 in proficiency in rating or 2.75 in conduct; or (3) Not recommended for re-enlistment.

Class-B.—Discharges by reason of medical survey for physical or mental disability:

Character of service	Conditions
Honorable	(1) Discharged as result of medical survey for physical or mental disability not the result of own misconduct or which disability existed prior to enlistment. (2) Qualified for honorable discharge as outlined in class-A.
Good	(1) Same as (1) above. (2) Marks and record do not meet the requirements of an honorable discharge.
Good	(1) Discharged as result of medical survey for physical or mental disability the result of own misconduct.

Class-C.—Discharges by special order of the Bureau of Navigation:

Cause	Character of service	Conditions
For man's own convenience at own request.	Good	(1) Discharged prior to expiration of enlistment for own convenience and at own request. (2) Average of marks, as computed in class-A, not less than 2.5 in proficiency in rating and 2.75 in conduct.
	Indifferent ..	(1) Same as (1) next preceding. (2) Average of less than 2.5 in proficiency in rating or 2.75 in conduct.
For under-age enlistment.	Good	(1) Discharged at request of parent received in Bureau within 60 days of date of enlistment if consent was not obtained at time of enlistment. (2) Is recommended for re-enlistment on becoming of legal age.
	Indifferent ..	(1) Same as (1) next preceding, or request not received in Bureau within 60 days of date of enlistment, or not at request of parents where under 17 years of age at time of desertion or absence over or without leave. (2) Is not considered desirable material for the Navy and is not recommended for re-enlistment on becoming of legal age.

Class-D.—Discharges for inaptitude:

Character of service	Conditions
Good	(1) General qualifications do not warrant retention; no reflection on the moral character of the man; does not leave the service under dishonorable conditions. (2) Average of marks, as computed in class-A, not less than 2.5 in proficiency in rating and 2.75 in conduct.
Indifferent	(1) Same as (1) next preceding. (2) Average of marks less than 2.5 in proficiency in rating or 2.75 in conduct.

Class-E.—Discharges by reason of undesirability:

Cause	Conditions
Fraudulent enlistment.	Discharged by authority of the Bureau of Navigation for fraudulent enlistment (including discharges because of under-age enlistment not at request of parent or guardian where the conditions warrant an undesirable discharge).
Desertion without trial.	Discharged by authority of the Bureau of Navigation because of desertion without being tried for that offense.
Conviction by civil authorities.	Discharged by authority of the Bureau of Navigation because of trial and conviction by civil authorities.
Unfitness	Discharged by authority of the Bureau of Navigation or commanding officer because unfitted for further retention.

Class-F.—Discharges in accordance with sentences of courts-martial:

Character of discharge	Conditions
Dishonorable ..	Discharged in accordance with the approved sentence of a general court-martial.
Bad conduct ...	Discharged in accordance with the approved sentence of a general or summary court-martial.

PROFICIENCY IN RATING AND CONDUCT

The importance of high marks in proficiency in rating and conduct is apparent from a study of the types of discharges. The following show how marks are assigned in these two important subjects:

For petty officers.—

Mark	Proficiency in rating	Conduct
4.0	Competent, thoroughly reliable, attentive, energetic, forceful. Not less than 3.5 in conduct.	No offenses; exemplary in conduct, bearing, and uniform; good influence on the ship.
3.5	Competent, distinctly above the average; has qualities sufficient to justify advancement. Not less than 3.5 in conduct.	Conduct positively good; no leave breaking offense; not more than one minor offense either in sobriety or of other nature.
3.0	Competent; reliable in his rating. Not less than 3 in conduct.	Minor offenses only, including leave breaking less than 3 hours.
2.5	Sufficiently good to justify retention in rating. Not less than 2.5 in conduct.	Minor offenses only, including repeated minor leave breaking or leave breaking more than 3 hours.
2.0	Sufficiently good to retain in rating only if there is shown immediate and decided improvement and has 3 or better in conduct.	More serious offenses either in sobriety or of other nature.
1.5	Unfit for further retention in present petty officer rating.	Unreliable as petty officer on account of nature of offenses.
1.0	Unfit for any petty officer-rating for any cause.	Unreliable as petty officer on account of nature of offenses.

Nonrated men.—

Mark	Proficiency in rating	Conduct
4.0	Competent and reliable in rating. Not less than 3.5 in conduct.	No offenses; exemplary in conduct, bearing, and uniform.
3.5	Competent; distinctly above the average; qualities sufficient to justify advancement. Not less than 3.5 in conduct.	No leave breaking; minor offenses only; not more than one offense in sobriety.
3.0	Competent; reliable in rating; satisfactory in conduct.	Satisfactory; no repeated leave breaking; not more than one offense in sobriety.
2.5	Sufficiently good to justify retention in rating.	Satisfactory.
2.0	Sufficiently good to retain in rating if improvement is shown.	More serious offenses either in sobriety or of other nature.
1.5	Unfit for retention in present rating.	Unreliable for any cause.
1.0	Unfit for rating for any cause.	Serious offenses.

Summary of marks.—

(1) To be recommended for honorable discharge:
  (*a*) Proficiency in rating 2.75
  (*b*) Conduct 3.0
(2) To be recommended for re-enlistment:
  (*a*) Proficiency in rating 2.5
  (*b*) Conduct 2.75
(3) To be recommended for good-conduct medal:
  (*a*) Proficiency in rating 3.5
  (*b*) No offenses or qualifying remarks entered in record.

The marks indicated above in conduct and proficiency in rating should not be exceeded in the following conditions:

	Proficiency	Conduct
Punishment of confinement by commanding officer		1.5
Sentence by summary court, except for incompetency		1.0
Sentence by deck court if more than 10 days' loss of pay		1.0
Reduction in rating, except for incompetency		2.5
Offense of leaving ship or duty without authority	3.0	0
Smuggling or attempting to smuggle liquor, or under influence of liquor or drugs not having been on liberty	3.0	0

ADVANTAGE OF HONORABLE DISCHARGE

An honorable discharge from our Navy is a testimonial of fidelity and obedience awarded to men discharged after a complete enlistment in the service, whose mark and conduct warrant such a discharge. An honorable discharge will be of immense value to you in seeking positions in civil life, in the event that you decide not to re-enlist within three months of the date of your discharge.

An honorable discharge opens all the advantages of the Navy to you in case you decide to remain in the naval service.

TRANSPORTATION AFTER DISCHARGE

In general, an enlisted man discharged from the Navy, except by way of punishment for an offense or by special order for his own convenience, receives 5 cents per mile as travel allowance for the distance from the place of his discharge to the place of his acceptance for enlistment in the Navy.

The following table is a guide:

Discharge	Cause	Payment
Honorable	Expiration of enlistment	Yes.
Do	Medical survey	Yes.
Ordinary	Expiration of enlistment	Yes.
Do	Medical survey	Yes.
Special order of Bureau	Request of man	No.
Do	Request of surviving dependent	Yes.
Do	Under-age enlistment (over 18 at discharge)	No.
Do	Under-age enlistment (under 18 at discharge)	Special.
Inaptitude	Inaptitude	Yes.
Undesirable	Fraudulent under-age enlistment	No.
Do	Fraudulent enlistment	No.
Do	Desertion without trial	No.
Do	Trial and conviction by civil authorities	No.
Do	Unfitness	Yes.
Bad conduct	Sentence of court-martial	No.
Dishonorable	.... do	No.

Travel allowance is paid on the first extension of an enlistment at the effective date thereof, but not after any subsequent extension of the same enlistment. Travel allowance is again payable on final discharge.

SERVICE RECORDS

The service records are kept by the executive officer and are carefully safeguarded, in order that unauthorized persons may not have access to them. Entries in service records are made under the direction of the commanding officer and executive officer and signed by either of these two officers. All marks are put in the record at the end of each quarter or at the date of occurrence. No erasures, interlineations, or ditto marks are used. Errors are lined with red ink and initialed by the commanding or executive officer. All correspondence with regard to a man, reports of examining boards, etc., are put in the service record, and a copy is sent to the Bureau of Navigation. All transfers, ratings, punishments, and commendable acts are entered in the record. The original record follows the man throughout his naval career, but is forwarded to the Bureau of Navigation when it is closed out, due to cancellation, discharge, desertion, death, retirement, transfer to Fleet Reserve, or when transferred to a civil hospital within the continental limits of the United States.

OVERSTAYING LIBERTY

You have seen how your mark in conduct is reduced by the offense of overstaying liberty.

Unauthorized absence.—*This is the most frequent offense committed by an enlisted man.* It takes numerous forms, varying in degree from the man who is delayed in returning to the ship by reason of a blockade in traffic, or one who is not called in the morning, to the man who deliberately remains out for months or years. It is such a common offense that some enlisted men do not regard it as a serious breach of discipline, and when they are severely punished they feel that they have been unfairly treated. *The fact that a man deliberately overstays his leave is, of course, a serious military offense, regardless of his reasons for overstaying, and this fact must be clearly understood.* Overstaying leave accidentally, which, despite the accident, involves neglect on your part—such, for example, as oversleeping—is an offense, but it is not serious provided you get back as quickly as possible after you wake up. Overstaying leave deliberately for any reason whatever is a very serious offense, because it defies the authority placed over you. For example, suppose you have order to return at 8:00 A.M. If at 8:00 A.M. you deliberately fail to return, whether it is because of business or sickness, you practically say: "I know I am ordered to be back, but I will stay as long as I wish, and then let them punish me." *In this manner, you are deliberately disobeying an order, and this is a military offense of the most serious nature.* So many excuses are given for this offense that it may be well to consider some of them.

Some men give as an excuse that they were intoxicated at 8:00 A.M. and stayed on shore to sober up. It is unnecessary to say that there is never any excuse for being intoxicated; but, if by any chance, you should feel intoxicated or in need of sleep when your liberty is up, *remember that the ship is the best place for you.* If you return to the ship in such a condition and raise no disturbance, your offense is much less serious than it would be had you overstayed your leave; consequently, your punishment will be much lighter.

Men sometimes state they were sick and bring the certificate of a doctor. Of course, if you really are too sick to return to the ship, that is an excuse; however, in this case you should telephone or telegraph the ship, a naval dispensary, or the nearest naval authority, reporting your condition and giving your address. If, instead of doing this, you take affairs in your own hands, you might be punished for being overtime.

Sickness of the family is sometimes offered as an excuse, but this is not

a valid excuse unless you have communicated with the ship. *You always have time to telephone or telegraph.* If you do this before your leave has expired, it creates a presumption in your favor, especially if you have a clear record, as it gives the ship's authorities a chance to investigate and give you necessary instructions. It shows that you desire to comply with regulations.

Sometimes mothers or other members of the family persuade men to overstay, and they sometimes appear as witnesses before a court. Remember always that this is never an excuse. *You are under oath to obey the regulations of the Navy, and no one can relieve you of that oath. Your punishment is just as serious if you remain away at the request of your mother as it would be had you remained away of your own accord.*

Men sometimes give as an excuse that they were held by the civil authorities. The law on this subject is that if men are tried and acquitted by civil authorities they are not to blame and no punishment is assigned for the absence due to their being thus held, provided they were in the custody of the civil authorities before leave expired. But if they are held by the civil authorities and found guilty of some misconduct, they have been held by reason of their own misconduct, and hence on their return to the ship they will be punished for overstaying their leave.

It frequently happens that men overstay their leave just before a ship sails, miss their ship, and give themselves up to another ship. In this case they are punished for missing ship, and in addition they lose pay and receive punishment for the entire time they are absent from naval control. This punishment is given because a man's duty is on the ship to which he is assigned; there is where he is needed, and during his absence other people must do his duty. If their ship is sailing from the United States, they are immediately declared deserters. *Therefore, if over leave or liberty and your ship is sailing, the thing to do is to report aboard as soon as possible. If this cannot be done, report at the nearest ship or station immediately.*

There is one feature about absence over leave that shows up in a very large number of courts-martial. A man gets out of money, or oversleeps, or for one reason or another finds himself overtime. Then, thinking that he will be punished anyway, he does not return immediately. This is the worst mistake you can make. *Always return just as soon as possible.* The sooner you get back the easier will be your punishment and the more likely will the officers be to accept your excuse. Officers always try to help a man who seems to be trying to help himself. It is the deliberate acts which are punished severely, and the longer you persist in remaining

outside the more severe your punishment will be. *Never remain outside a minute because you feel that you will be punished anyhow. The longer you remain out the more severe your punishment becomes.*

DESERTION

Desertion consists of absence from station and duty with intent to leave the service permanently. A man is guilty of desertion if at any time during his absence he has the intention of quitting the service permanently. Many facts serve to indicate such intent—for example, the disposal of uniform, going outside and establishing oneself and failing to make an attempt to return. Much the same excuses are given to courts as in the case of absence over leave.

Few men realize how frequently deserters are apprehended. A very large percentage of the men who desert are either taken into custody or voluntarily surrender. In many instances, deserters are apprehended by the civil police, who are all over the United States and keep a list of all deserters, their home addresses, finger prints, etc. Rewards paid civil police and others for apprehending deserters are not paid by the government, but by the deserter. They are checked from his pay.

Likewise, there are few enlisted men who realize the effect of desertion. If men could but read the appealing letters from mothers, wives, and sweethearts concerning those men who have been taken from them because of desertion, no one would ever desert. These letters tell the chagrin of having a son or a husband in prison and often of a destitute condition due to the fact that he loses all pay. Hundreds of such letters are received by the Navy Department. Often these letters tell how good a son, or a brother, or a husband the man made, but they rarely, if ever, do any good for the simple reason that the Department is punishing the man for a specific act (deserting) which he committed, and all his goodness to his family does not remove from his record this violation of the law. Not infrequently it happens that his imprisonment is as much a punishment to his family as to himself, but he brought it on and has himself to blame.

There are several things to remember about desertion and absence over leave:

(1) It is always better to surrender than to be arrested and brought back.

(2) It is better to surrender in uniform than in civilian clothes.

(3) The sooner you surrender the better. The less time you remain out the better off you will be.

(4) There is never any excuse for an unauthorized absence of over 24 hours without communicating with the ship.

(5) There is never any excuse for desertion that can be accepted by any court.

(6) Finally, when you are in prison your family and dependents suffer as much as you do, often more, for while you are in prison you are at least fed.

The following is taken from a deserter's statement:

> I deserted on account of my sister being sick. I could not get liberty, and I ran away from the ship and went to see my sister. I did not intend to desert and would like to be restored to duty.

This is an actual case, and it is typical of a very large number of statements. In this case the sentence was 18 months in prison. If the man had behaved and had a clear record, and if his sister had really been sick enough to necessitate his presence, he probably could have obtained the desired permission. The question arises whether the pleasure of remaining at home was worth the punishment of 1½ years in prison on reduced fare, at hard labor, and with loss of all pay during that time.

NAVAL COURTS-MARTIAL

There are three types of courts-martial in our Navy, namely, deck court, summary court-martial, and general court-martial.

Deck court.—This court consists of 1 officer and is convened by the commanding officer when he thinks the offense demands a punishment more severe than he is authorized to assign. A man may object to being tried by a deck court, and in this case he is assigned a summary court-martial. A deck court can assign the same punishments as a summary court-martial, except that in no case can a deck court adjudge discharge from the service or adjudge confinement or forfeiture of pay for a longer period than 20 days.

Summary court-martial.—This court consists of 3 officers as members, and 1 officer as recorder. It is convened by the commanding officer for offenses which demand a punishment more severe than can be given by a deck court. A summary court-martial can assign any one of the following punishments:

(*a*) Discharge from the service with bad-conduct discharge; but the sentence shall not be carried into effect in a foreign country.

(*b*) Solitary confinement, not exceeding 30 days, on bread and water, or on diminished rations.

(*c*) Solitary confinement not exceeding 30 days.

(*d*) Confinement not exceeding 2 months.

(*e*) Reduction to next inferior rating.

(*f*) Deprivation of liberty on shore on foreign station.

(*g*) Extra police duties and loss of pay not to exceed 3 months may be added to any of the above punishments.

General court-martial.—This court consists of not more than 13 nor less than 5 officers as members and 1 officer as judge advocate. It is convened by the President, the Secretary of the Navy, the commander of a fleet or squadron, and other authorized officers. A general court-martial can assign any punishment up to the death penalty.

PUNISHMENTS BY THE COMMANDING OFFICER

For minor offenses which do not warrant one of the three courts-martial, the commanding officer will award the punishment. The regulations governing these punishments are as follows:

(1) Reduction of any rating established by himself.

(2) Confinement, not exceeding 10 days unless further confinement be necessary in the case of a prisoner to be tried by court-martial. (The use of irons, single or double, is abolished except for the safe custody or when imposed as part of a sentence by general court-martial.)

(3) Solitary confinement on bread and water, not exceeding 5 days.

(4) Deprivation of liberty on shore.

(5) Solitary confinement not exceeding 7 days.

(6) Extra duties.

CHAPTER 21

D—PAY AND ACCOUNTS

Pay grades 159
Extra allowances 160
Accounts: Payments of money 160
Loss of pay due to breaking liberty 161
Example of chief petty officers' pay 161
Time not served and time lost due to misconduct 162
General information on stores titles 162
Ships' allotments 163

PAY GRADES

THE RATES of pay of all persons in the government service are fixed by law and vary from time to time as laws are amended, so that it would be well to consult the officer carrying your pay account in regard to the correct rate of pay to which you are entitled.

The following table shows the existing distribution of ratings to the several pay grades, with the basic pay per month of each grade.

Grade	Pay per month	Class or rating
1	$126	Chief petty officers (permanent).
1-A	99	Chief petty officers (acting).
2	84	Petty officers, first class; officers' stewards and cooks, first class; musicians, first class.
3	72	Petty officers, second class; officers' stewards and cooks, second class; musicians, first class.
4	60	Petty officers, third class; firemen, first class; officers' stewards and cooks, third class; musicians, second class.
5	54	Nonrated men, first class (except firemen, first class; and musicians, first class); firemen, second class; musicians, second class; mess attendants, first class.
6	36	Nonrated men, second class (except firemen, second class and musicians, second class); firemen, third class; mess attendants, second class.
7	21	Nonrated men, third class (except firemen, third class); mess attendants, third class.

EXTRA ALLOWANCES

In addition to the base pay shown in the table (p. 159), men receive further increases in pay as follows:

(1) For length of service the base pay is increased 10 per cent after the first 4 years of service and 5 per cent additional for each 4 years' service thereafter, the total not to exceed 25 per cent.

(2) For awards of the medal of honor, distinguished-service medal, distinguished flying cross, or Navy cross, $2.00 per month is added to the pay, beginning at the time of winning the medal and lasting during the service of the man.

(3) Other additions to pay are:

Crews' messmen, $5.00 per month.

Gun captains, $2.00 to $5.00 per month.

Gun pointers and gun director pointers, $2.00 to $5.00 a month.

Gun range finder operators, $5.00 per month.

Mail clerks, $10 to $30 per month.

Expert riflemen, $3.00 per month.

Expert pistol shot, $3.00 per month.

Sharpshooter, $1.00 per month.

Divers, $10 to $20 per month.

Unqualified men for submarines get $5.00 to $10 additional pay per month.

Qualified men for submarines get $20 to $30 additional pay per month.

Enlisted men serving with aviation and receiving individual flight orders receive an increase of 50 per cent of the pay of their rating.

ACCOUNTS: PAYMENTS OF MONEY

The pay accounts are kept by an officer of the Supply Corps, who is known as the disbursing officer. He assigns each man a pay number. The commanding officer gives the disbursing officer orders to pay any extra allowance, such as for gun captain, mess cook, etc. When small stores are drawn, the original slip with the amount purchased goes to the disbursing officer, and this amount is subtracted from the man's pay. A copy of this slip is given to the man when he draws the clothing. To protect himself, the man must insist that the amount of each item be filled in on both copies of the receipt and the total entered at the bottom. A sum of 20 cents is also subtracted each month from everyone in the Navy for hospital expenses. The men draw their pay twice per month, on the 5th and 20th.

Men must remember that their pay, except what is necessary to clothe them, is nearly all clear money. They have many allowances in addition to their pay. Their ration is quite sufficient to feed them. They have no board bill to pay. If they are sick they get medical attendance free. In case of serious illness they are sent to a hospital and cared for by the government. If they are injured in line of duty, they get a pension. They would get no such allowance in civil life.

Enlisted men with the approval of the captain are permitted to make an allotment of a part of their pay to their dependents or to a savings account. The disbursing officer makes out the allotment, and it is paid monthly from the Navy Allotment Office, Washington, D.C.

The disbursing officer of a ship will receive deposits of money at the risk of the owners and keep them in a safe. Every precaution will be taken for the safekeeping of such deposits.

Men may deposit money with the disbursing officer in sums not less than $5 and receive interest thereon from the government at the rate of 4 per cent per annum. Each depositor is furnished with a deposit book, which for safety is kept by the disbursing officer until the man leaves the ship. These books are then transferred with the man to the new ship, but the book belongs to him at all times. This is an excellent way for a man to save money. Deposits may not be withdrawn until a man is discharged.

Each man is advised to keep his own record of his account with the disbursing officer. Each man knows what pay he draws per month and what extra allowances he receives. Keep strict account of all you receive from the disbursing officer during the quarter, and the difference between this and your pay for the quarter is what is due you.

Men should ask for a special money requisition only under the most urgent necessity.

LOSS OF PAY DUE TO BREAKING LIBERTY

A man receives no pay for the period that he is absent over leave or without leave. In addition to this, he is punished for the offense, and this punishment, if by a deck or summary court, usually consists of loss of pay. For a serious case of this offense, a summary court can give a fine of three months' loss of pay.

EXAMPLE OF CHIEF PETTY OFFICERS' PAY

The following is an example of chief petty officers' pay without any extra allowances:

Grade	Base pay first 4 years' service	Base pay plus 10% second 4 years' service	Base pay plus 15% third 4 years' service	Base pay plus 20% fourth 4 years' service	Base pay plus 25% after 16 years' service
Chief petty officers with permanent appointments	$126.00	$138.60	$144.90	$151.20	$157.50
Chief petty officers with acting appointments ...	99.00	108.90	113.85	118.80	123.75

TIME NOT SERVED AND TIME LOST DUE TO MISCONDUCT

Time served in any enlistment is computed by deducting from the time intervening between the dates of enlistment and discharge all time lost due to:

(1) Absence over leave or without leave, including desertion.

(2) Sickness, disease, or injury resulting from his own intemperate use of drugs or alcoholic liquors or other misconduct.

(3) Absence while in civil arrest resulting in sentence and while serving such sentence.

(4) Furlough without pay.

(5) Nonperformance of duty because of imprisonment both while awaiting trial resulting in court-martial sentence and while serving said sentence.

GENERAL INFORMATION ON STORES TITLES

Most men have but a hazy idea of what is meant by title A, title B, etc., and what their responsibilities in regard to them are. The following paragraphs will explain the meaning of these titles and give information which will assist men in taking proper care of articles and stores placed in their custody.

All expenditures of the Navy are reported to the Bureau of Supplies and Accounts by titles. The following is a list of titles which concern men on board ship:

Title A.—First cost of ships (hull, machinery, and permanent fittings). Title A articles on board ship, therefore, are the hull, machinery, and all permanent fittings.

Title B.—Ships' equipage, or articles which make the ship manageable, habitable, and serviceable as a naval vessel, as guns, furniture, special tools, etc.

Title C.—Operating expense. This includes pay of officers and

crew, value of rations, stationery, paints, coal, oil, ammunition used in target practice, and other expenses incidental to the maintenance of the vessels in commission.

Title D.—All repairs to ships, that is, repairs to title-A articles, and repairs to ships' equipage (including ordnance) and repairs to aircraft ashore.

Title K.—Changes and alterations to ships.

Title X.—These are stores carried by the supply officer and, when issued, become title C.

SHIPS' ALLOTMENTS

Ships are assigned allotments of a certain amount of money each quarter for use in the upkeep, repair, and operation of the ship. Each department on board is assigned an allotment usually administered on the ship. Each department or ship must not exceed this allotment except in an emergency. This allotment is expended under titles B, C, D, and K. As an example, the engineer officer of a battleship has an allotment for the quarter of a specified amount. He draws out 200 gallons of lubricating oil on a title-C requisition. He draws out a special title-B wrench to replace one broken and surveyed on a title-B requisition. He draws out some steel plating to repair a bulkhead, or title-A article, and this is charged to title D. He draws out piping to use in an alteration of some steam leads. All of these items are charged against and must be paid for out of his allowed allotment.

It is the duty of everyone to prevent waste of title-C materials. It is also the duty of everyone to care for the title-B equipage which is necessarily found in every part of the ship. This equipage is in the custody of certain men, and they will be held responsible in case of loss, but all hands must lend their aid to see that this equipage is not carelessly misplaced by them. Broken title-B articles should be saved so that they can be surveyed and replaced by new articles.

Title-B articles must be inventoried annually. The heads of departments usually require all men under them who hold title-B custody receipts to account for them more frequently. The supply officer has a list of all title-B articles in use in each department on the ship, and the head of that department has to sign a custody receipt for these articles. The head of department then requires his division officers and certain other men to sign a custody receipt to him for all equipage belonging to his department which is assigned to them. The division officer then divides these articles among his section leaders or men in

charge of parts of his division and requires them to account to him for them. Men who sign these custody receipts must realize that they are responsible for these articles and must check up on them frequently. If one of these men cannot account for them, he must report the fact immediately to his division officer. Failure to do this is a serious offense.

Lost or missing title-B articles are surveyed as soon as possible by an officer appointed by the commanding officer, if the value of any one article does not exceed $100, or the total of identical articles does not exceed $100, and by a board of three officers if values are greater. These survey boards make a searching and exhaustive investigation of the circumstances and in every case fix the responsibility for the loss. In case the loss is due to carelessness on the part of any person, the commanding officer will assign punishment as the case demands. Surveying officers do not hold men responsible for loss due to stress of weather or casualties if witnesses can be found to prove the cause of loss; and a great deal of trouble is avoided if the survey is held before the facts are forgotten.

Title-B articles broken or worn out in use must be kept for the inspection of the officer or board of officers conducting the survey. Action is taken to replace these articles after the survey report is approved.

CHAPTER 22

E—NAVY CUSTOMS, NAVAL ORGANIZATION

Rules regarding salutes 165
Rules for saluting officers 166
National anthem 168
National flag 168
Quarter-deck and gangways 169
The Navy and its relation to the government 170
The President 170
The Secretary of the Navy 170
Bureaus and offices 171
The commander in chief of a fleet 172
Rank 172
Corps devices 173
Exercise of authority 174

RULES REGARDING SALUTES

Salutes.—Nothing gives a better indication of the state of discipline than the observance of forms of military courtesy.

From time immemorial the salute has been a form of military courtesy that has been strictly and conscientiously observed by men of every nationality who follow the profession of arms.

In falling in with foreign ships, the national salute of 21 guns is fired and in turn answered by the foreign ships.

In regard to personal salutes, a junior always salutes a senior. An enlisted man salutes an officer, and the officer saluted is called to account if he fails to salute another officer, his senior. Salutes are not rendered while uncovered.

Enlisted men are often lax in the matter of saluting. This laxity is usually due to ignorance of how to salute properly or to uncertainty as to when the salute is required.

If uncertainty exists in regard to the necessity for saluting, the only rule to follow is to render the salute. It is far better to salute, even if in doubt as to the necessity for so doing, than to expose yourself to the chance of censure and reprimand and to be thought ignorant of the rules of one of the most essential and elementary requirements of your profession.

Unfortunately, there are some men who deliberately fail to salute

an officer and then, when called to account, rely upon giving some babyish excuse about their not having seen him or something equally foolish and untrue. By observing the petty officers and seamen, recruits will learn that the higher a man's rating the better he realizes the necessity for saluting and the more pride he takes in rendering the salute properly.

To salute another person in the naval service is in no way a sign of humility or an admission of individual inferiority; it is a form of military courtesy observed by men who follow the profession of arms.

How to render the salute properly and the few simple rules regarding salutes should be among the first things learned by a recruit.

RULES FOR SALUTING OFFICERS

(1) All officers and enlisted men salute the captain and all officers senior to the captain on every occasion of meeting, passing near, or being addressed by them.

(2) On board ship enlisted men salute all officers junior to the captain on their first daily meeting or passing near, and whenever addressed by them or addressing them. At other times they clear the gangway and stand at attention facing the officer until he has passed.

(3) All men salute the executive officer or other officer when he is making an inspection.

(4) Men actually engaged in work salute only when addressed by an officer or called to attention.

(5) When in military or divisional formation, men do not salute when addressed by an officer but, if at rest, they come to attention.

(6) Men who are seated at work, at games, or at mess are not required to rise when an officer, other than the captain or the admiral, passes, except when they are called to attention or when it is necessary for them to arise in order to clear a gangway.

(7) Enlisted men who are passengers in the stern sheets of a boat and the coxswain shall always rise and salute when a commissioned officer enters or leaves their boat.

(8) Boat keepers and all other men in boats not under way and not containing an officer shall, when boat awnings are not spread, stand and salute when an officer comes alongside, leaves the side, or passes near them, and shall remain standing until the boat passes or reaches the ship's side. If boat awnings are spread, they shall salute with the hand without rising, but motor boats with canopies shipped shall not be considered as boats with awnings spread.

(9) All salutes in passing or approaching are begun first by the junior at 6 paces distant or at 6 paces from the nearest point of passing.

(10) Officers in civilian dress are saluted in the same manner as when in uniform.

(11) When an officer enters the room where there are enlisted men, *Attention* is called by some one who perceives him; then all rise, remain standing at attention, uncovered, preserving silence, until the officer leaves the room. If at meal, they will not rise.

(12) An enlisted man being seated and without particular occupation rises on the approach of an officer, faces toward him, and salutes. If standing, he faces toward the officer for the same purpose. If the parties remain in the same place or on the same ground, such compliments need not be repeated. If actually at work, men do not cease their occupation to salute an officer unless addressed by him.

(13) Men at all times and in all situations pay the same compliments to officers of the Army, Navy, and Marine Corps, to officers of the volunteers and militia in the service of the United States, and to officers of foreign services as they do to the officers of the ship or command to which they belong.

(14) The bugle call *Attention* is a signal for every man on board ship to stand at attention and face the person for whom *Attention* is sounded, if he can be seen; otherwise, stand at attention, facing outboard. However, men inside the ship on covered decks, if not in sight through gun ports or other openings, are not required to obey the bugle call, but they must keep silence until *Carry on* is sounded.

(15) Men working over the ship's side come to attention when the bugle sounds *Attention*.

(16) The command *Gangway* should be given by anyone who observes an officer approaching a gangway that blocks his passage. Attention is paid to extending this courtesy to civilians as well as officers. There must be no doubt but that the gangway has been properly cleared. The senior officer or the petty officer in the immediate vicinity is responsible that this is done promptly. The requirements of the command *Attention* are also carried out if applicable when officers are escorting visitors through their own ships. The requirements of the commands *Attention* and *Gangway* must be strictly complied with, whether the visitors are officers from other ships or civilians. If the party is not to pass on promptly, the order *Carry on* is given without unnecessary delay.

(17) When an enlisted man receives an order from an officer, the

proper reply to make is *Aye, aye, sir.* Never use the expressions *Very good, sir* or *Very well, sir.*

"THE STAR-SPANGLED BANNER" IS OUR NATIONAL ANTHEM (See facing p. 1)

Whenever the national anthem is played on board a vessel of the Navy, at a naval station, or at a place where persons belonging to the naval service are present, all officers and men not in formation:

(1) Stand at attention and face toward the music, except at colors, when they face toward the colors.

(2) If covered and in uniform, salute at the first note of the anthem and retain the position of salute until the last note of the anthem.

(3) If covered and not in uniform, uncover at the first note of the anthem and hold the headdress opposite the left shoulder until the last note of the anthem, except in inclement weather, when the headdress may be slightly raised above the head.

(4) The same marks are observed during the playing of the national anthem of any other country upon official occasions.

(5) The playing of the national anthem of the United States or of any other country as part of a medley is prohibited.

OUR NATIONAL FLAG

The flag of the United States of America consists of 13 horizontal stripes, alternate red and white, and a union of 48 stars, white, on a blue field. The number of stripes represents the original 13 states that formed the United Colonies in 1776. The number of stars in the union of the flag corresponds with the number of states in the union. On the admission of a new state into the union, the star for that state is added to the union of the flag on the Fourth of July next after the admission of the new state.

The following ceremonies are observed at *colors* on board ship and stations in commission. The field music, guard of the day, and the band, if there be one, are present. At morning colors the band plays the national anthem, at the beginning of which the national ensign is started up and hoisted smartly to the peak of the truck. All officers and men face the ensign and salute as described for rendering honors to the national anthem. The guard of the day and sentries under arms come to the position of *present arms* and so remain while the national anthem is being played.

If no band is available, the field music sounds *colors* in place of the national anthem, and the same salute is made. The same ceremonies are observed at sunset *colors*.

The ensign* starts from the peak of the truck at the beginning of the national anthem. The ensign is not lowered hurriedly, nor is it allowed to touch the deck.

At naval stations the same ceremonies are observed as closely as possible.

The same honors are rendered at *colors* to foreign ensigns, except that where such honors are rendered simultaneously to our own and to foreign ensigns the honors to our own are given first, and then the honors are given to the foreign ensigns in order of rank. In foreign ports the honors are given our ensign first, followed by honors to the ensign of the country whose port it is.

QUARTER-DECK AND GANGWAYS

The commanding officer defines the limits of the quarter-deck. It embraces as much of the main or other appropriate deck as may be necessary for the proper conduct of official and ceremonial functions.

The starboard gangway is used by all commissioned officers and their visitors; the port gangway is used by all other persons. If the construction of the ship and other circumstances make a change in this rule expedient, the change may be made at the discretion of the commanding officer. In heavy weather the lee gangway is used by everyone.

Each officer and man whenever reaching the quarter-deck, either from a boat, from a gangway, from the shore, or from another part of the ship salutes the national ensign. This salute is distinct from the salute to the officer of the deck; the person making it stops at the top of the gangway or upon arriving on the quarter-deck, faces the colors, and renders the salute, after which he salutes the officer of the deck. In leaving the quarter-deck the same salutes are rendered but in the reverse order.

All men must receive permission from the officer of the deck before leaving the ship. When the man's name has been checked off on the liberty list, such permission is considered to have been granted. When returning aboard ship, all men will report their return to the officer

* The word ensign, in this case, means the national flag.

of the deck, using the form, "I report my return aboard, sir." When going aboard a ship other than the one to which he is attached, a man, after saluting the colors, salutes the officer of the deck and reports, "I request your permission to come on board, sir." When about to leave this ship, the man salutes the officer of the deck and reports, "I request your permission to leave the ship, sir."

THE NAVY AND ITS RELATION TO THE GOVERNMENT

The government, in the persons of the President and Secretary of State, by and with the advice and consent of the Senate, formulates certain policies which control our relations with foreign countries. These policies would be worthless if our country were not in a position to enforce them in case of necessity. An example of one of these policies is the Monroe Doctrine which prohibits foreign governments from taking over any of the countries on this hemisphere for purposes of conquest and colonization. In several cases since this doctrine was formulated, our country has had occasion to enforce it by a show of arms. The Navy's primary duty is to enforce our country's foreign policies, and in addition to protect our country from obnoxious policies of foreign countries. The strength of our Navy, its composition of ships, etc., must largely depend upon our foreign policies and the policies adopted by foreign countries. Due to our isolated position from the strong European and Asiatic countries, our Navy is naturally our first line of defense. Our Navy must be ready at all times to meet any emergency which may arise. These emergencies can arise at *any* time and when most people least expect them. Our Navy must prepare in time of peace to enter a fight at any moment with our full strength of ships and with the personnel fully trained.

THE PRESIDENT

In accordance with the Constitution of the United States, the President is the commander in chief of both the Army and the Navy.

THE SECRETARY OF THE NAVY

By an act of Congress, approved April 30, 1798, there was established "an executive department to be denominated the Department of the Navy," and the chief officer of that department was therein directed to be called the "Secretary of the Navy." Appointment of the Secre-

tary is made by the President, by and with the advice and consent of the Senate, and he is a member of the President's Cabinet. The Secretary executes such orders as he may receive from the President relative to the procurement of naval stores and materials and the construction, armament, equipment, and employment of vessels of war, as well as all other matters connected with the naval establishment. He is aided in carrying out these duties by an Under Secretary and an Assistant Secretary of the Navy. In addition, the Secretary of the Navy has the following naval officers in charge of bureaus to assist him in the operation and management of the Navy.

BUREAUS AND OFFICES

The Chief of Naval Operations holds the rank of admiral.—This officer is the senior officer in the Navy while acting as Chief of Naval Operations. Under the Secretary of the Navy, he is charged with the operations of the fleet and with the preparation and readiness of plans for its use in war.

Bureau of Navigation.—A rear admiral of the line is in charge. The Bureau, under the direction of the Secretary of the Navy, is charged with and responsible for the procurement, education, training, discipline, and distribution of officers and enlisted personnel of the Navy, including the Naval Reserve and the Reserve Officers Training Corps (except the professional education of officers, nurses, and enlisted men of the Medical Department) ; furnishing supplies of navigational equipment to ships; and the operations of the Naval Observatory, Hydrographic Office, and recruiting stations.

Bureau of Medicine and Surgery.—A rear admiral of the Medical Corps is in charge. He has charge under the Secretary of the Navy of the upkeep and operation of all hospitals and the force employed therein; of the care of the sick and injured; physical examination of personnel in the Navy; training, promotions, etc., of the Hospital Corps; sanitation; and supply of all medical and dental supplies to the Navy.

The Judge Advocate General is a rear admiral of the line. He is charged, under the law creating his office, with all matters of law arising in the Navy Department, including the preparation of charges and specifications for general courts-martial convened by the Secretary of the Navy, and the review of the records of proceedings of all courts-martial, deck courts, courts of inquiry, and boards of investigation.

Bureau of Ships.—A rear admiral of the line (assigned for en-

gineering duty only) is in charge. He has charge under the Secretary of the Navy of strength, stability, designing, building, fitting, and repairing of all parts of ships of the Navy except as pertains to Ordnance.

Bureau of Ordnance.—A rear admiral of the line is in charge. He has charge under the Secretary of the Navy of the upkeep and operation of all ordnance establishments such as magazines, gun factory, torpedo stations, proving grounds, etc.; manufacture of arms, armor, and explosives; and upkeep and repair of ordnance equipment aboard ship.

Bureau of Yards and Docks.—A rear admiral of the Civil Engineer Corps is in charge. He has charge under the Secretary of the Navy of the design, construction, repair, upkeep, and operation of public works and public utilities of the Navy.

Bureau of Supplies and Accounts.—A rear admiral of the Supply Corps is in charge. He has charge under the Secretary of the Navy of the purchase, reception, storage, care, custody, transfer, shipment, issue, and accounting for all supplies and property of the Navy, except medical supplies (but including their purchase) and supplies for the Marine Corps.

Bureau of Aëronautics.—A rear admiral of the line is in charge. He has charge of the purchase, design, repair, building, and fitting out of all aircraft.

Commandant of the Marine Corps.—A major general of the Marine Corps is in charge. He has charge under the Secretary of the Navy of the general efficiency and discipline of the Marine Corps.

THE COMMANDER IN CHIEF OF A FLEET

The title of "commander in chief" is given to an officer placed in command of a fleet by order of the Navy Department. At present we have three, namely:

(1) Commander in chief, United States Atlantic Fleet.
(2) Commander in chief, United States Pacific Fleet.
(3) Commander in chief, United States Asiatic Fleet.

The commander in chief of one of these fleets will be appointed "commander in chief, United States Fleet."

RANK

The rank of an officer is primarily indicated by the number and kind of gold stripes on his sleeve, or shoulder marks.

The following stripes are worn on the sleeves of blue uniforms of officers:

Admiral—One 2-inch stripe with three ½-inch stripes above it.
Vice admiral—One 2-inch stripe with two ½-inch stripes above it.
Rear admiral—One 2-inch stripe with one ½-inch stripe above it.
Captain—Four ½-inch stripes.
Commander—Three ½-inch stripes.
Lieutenant commander—Two ½-inch stripes with one ¼-inch stripe between the other two.
Lieutenant—Two ½-inch stripes.
Lieutenant (junior grade)—One ½-inch stripe with one ¼-inch stripe above it.
Ensign—One ½-inch stripe.

Chief warrant officer—One ½-inch stripe
Warrant officer—One ¼-inch stripe ...

The gold lace to be woven at intervals of 2 inches with dark-blue silk thread in widths of ½-inch.

The following shoulder marks are worn by officers on white uniforms and overcoats:

Admiral—Anchor with 4 stars on background of gold lace.
Vice admiral—Anchor with 3 stars on background of gold lace.
Rear admiral—Anchor with 2 stars on background of gold lace.
Captain and ranks below—On a black background, the same number and width of gold stripes as worn on the sleeve of blue uniforms.

CORPS DEVICES

In addition to the insignia of rank indicated by the aforementioned markings, the officers of the several corps and warrant officers wear corps devices. (See Figs. 22-1 and 22-2.)

Line

Civil engineer

Dental

Chaplain

Supply

Medical

FIG. 22-1—Corps devices.

Boatswain

Gunner

Carpenter

Machinist

Radio electrician

Pay clerk

Pharmacist

Electrician

FIG. 22-2—Warrant officer insignia.

EXERCISE OF AUTHORITY

The regulations for the exercise of authority are as follows:

(1) "All persons in the Navy are required to obey readily and strictly and to execute promptly the lawful order of their superiors."

(2) "Superiors of every grade are forbidden to injure those under their command by tyrannical or capricious conduct or by abusive language. Authority over subordinates is to be exercised with firmness, but with justice and kindness."

These articles are, of course, applicable to petty officers as well as to officers.

CHAPTER 23

F—GENERAL CHARACTERISTICS OF SHIPS

General 175
Hull 175
Armor 177
Drainage system 178
Ventilation system 178
Water-tightness 179
Nomenclature of decks 179
Bulkheads 180
Peak tanks 180
Questions and answers 180

GENERAL

A SHIP may be defined as a large seagoing vessel. In other words, it is a structure that will float and is capable of making ocean voyages. Its purpose is to furnish a means for over-water transportation. It may be considered as an enlarged boat.

HULL

A ship is actually built by providing a certain framework, over which is fitted a complete envelope of plating or planking which forms the "skin" of the ship, keeps out the water, and assists in furnishing strength. The framing is a most important part of the ship because it furnishes a necessary part of the structural strength. The framing and skin are together with their various connections known as the *hull* of the ship.

The principal parts of the hull of a modern ship are described below, and the locations of many of them are shown in Fig. 23-1.

In order to give a general idea of the interior arrangement of all ships the various subdivisions, parts, and fittings of the ship will be briefly described.

The keel runs longitudinally along the center of the bottom of the ship and is connected at the forward end to the *stem,* which is of great strength, and at its after end to the *sternpost,* which is also of great strength, and extends up to the counter.

Frames.—To the keel are attached the frames, which extend trans-

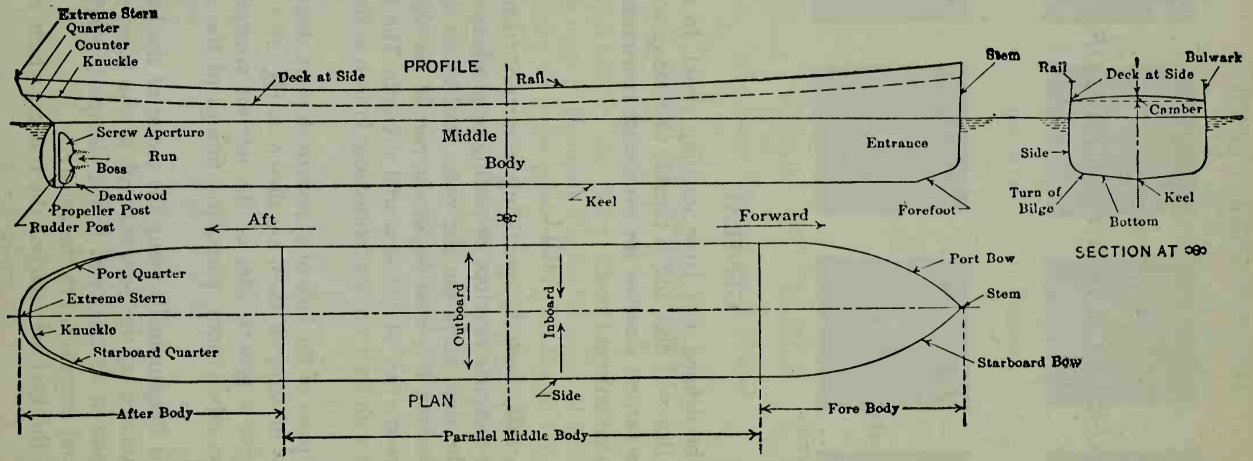


FIG. 23-1—Parts of a ship (courtesy of McGraw-Hill Book Co.)

versely, being distributed throughout the length of the ship at regular intervals so as to give sufficient support. To them is attached the shell plating. The transverse frames are given support against fore-and-aft movement by *longitudinal framing,* so that the framing of the ship really consists of a network of fore-and-aft and transverse members crossing each other approximately at right angles. All of this framing is in turn further supported by the decks and bulkheads.

An inner bottom is fitted on large ships; this extends up the side to various heights on various types of vessels. The double bottom extends fore and aft to a greater or less degree, depending upon the particular type of ship; it is subdivided into small cells by water-tight frames and water-tight longitudinals, so that the leakage may be reduced to a minimum if the ship's bottom is perforated by any cause. In some cases the frames near the bow and stern are spaced more closely than elsewhere to provide local strength.

Decks provide shelter, working spaces, and living quarters; they subdivide the hull horizontally into a still greater number of water-tight compartments. They are important longitudinal strength members, particularly the higher decks that are continuous. Decks are generally of steel and they may or may not be covered with planking or linoleum. Weather decks of large warships are generally planked and calked, but if steel is not first laid under the wood, deck stringers and tieplates are used. The deck beams are generally supported by stanchions. To secure accessibility to all parts of the ship, numerous hatches, doors, scuttles, and manholes are provided; these are water-tight when necessary, and the hatches on upper decks are always fitted for battening down.

ARMOR

A water-line belt of heavy armor, varying in height on different armored ships, extends from well forward of the forward group of magazines to aft of the after group of magazines, thus protecting the ship for about three-quarters of her length. This belt usually varies in thickness from the top to the bottom. The ends of this belt are connected by athwartship armor of about the same thickness.

On some ships a narrow water-line belt of heavy armor extends aft to the steering gear and rudder post.

The turrets revolve within and above protected spaces called barbettes, protected by armor. The barbettes extend in varying thicknesses of protection down as far as the protective deck.

Conning towers are built of heavy armor. They are connected to the

protective deck by armored tubes, so as to prevent the system of steering and communication from being shot away.

A protective deck of special-treatment steel of varying thickness extends practically the whole length of the ship and is generally located at a height slightly above the water line.

DRAINAGE SYSTEM

Water is pumped out of various compartments by means of the drainage system. As a general rule, each compartment is either connected to the pumps by piping or is arranged to drain through sluice valves into other compartments that can be pumped out. In order to remove water in large quantities from the main machinery compartments, there is a large pipe, called the main drain, connecting with them; in case of serious leaks both circulating pumps can be put on the main drain in some ships. The secondary drain is a pipe of smaller diameter running throughout the length of the ship. The entire system of piping is called the drainage system of the ship.

VENTILATION SYSTEM

The ventilation system consists of piping and fans by which fresh air is supplied to compartments below. Many fans are installed on a large ship; they force air down into large trunks from which it is led into various compartments in smaller ducts or pipes. Each of these pipes has a small damper for turning the air on or off; the openings of these pipes are covered with wire netting, which must be kept clean and free from loose paper and dust. The ventilation system also provides for the escape of foul air from closed compartments below. Natural ventilation is provided through trunks whose upper ends are fitted with cowls or ventilators, and in some cases by wind sails. These cowls and wind sails, when trimmed to the wind, send fresh air below, forcing the foul air outboard through the hatches, ports etc., or through exhaust cowls, which must, of course, be trimmed away from the wind. In large ships the artificial ventilation system is very extensive, but all ships, large or small, use natural ventilation a great deal, and care on the part of the men will frequently increase their comfort materially. Care should be taken to see that there is every opportunity for supply and exhaust, so that a constant circulation may be maintained, or, in the case of artificial ventilation, that the wire mesh covers are not choked and that the cowls are properly trimmed.

WATER-TIGHTNESS

Plates of the hull, bulkheads, or decks that are meant to be water-tight are closely riveted, and the seams and butts are calked, metal to metal. In many cases on modern vessels, water-tightness is secured by continuous welding of all seams and boundaries. The planking of decks is made water-tight by filling the seams with oakum, which is driven down, or calked, then payed with hot pitch or with marine glue or putty. Ports, hatches, water-tight doors, etc., are hinged and are made water-tight by compressing rubber gaskets between the cover frame and the frame of the plating to which they are hinged; for compressing the rubber, dogs or clamps are used. All openings in water-tight bulkheads are similarly made water-tight. In some locations doors are arranged to slide vertically, and they become water-tight by wedging the two metal surfaces together. It is most important that all appliances for securing water-tightness be kept in an efficient condition. If not, when the emergency comes, the various water-tight compartments that have been relied on to keep the ship afloat in just such an emergency will prove to be not water-tight, and there are numerous cases in which such carelessness has caused the loss of the ship.

NOMENCLATURE OF DECKS

The following nomenclature of decks is followed for United States naval vessels:

The highest deck extending from stem to stern is called the *main deck.*

A partial deck above the main deck at the bow is called the *forecastle deck;* at the stern, *poop deck;* amidships, *upper deck.*

The name "upper deck," instead of "forecastle deck" or "poop deck," is applied to a partial deck extending from the waist to either the bow or the stern.

A partial deck above the main, upper, forecastle, or poop deck and not extending to the side of the ship is called the *superstructure deck.*

A complete deck below the main deck is called the *second deck.* Where there are two or more complete decks below the main deck, they are called the second deck, third deck, fourth deck, etc.

A partial deck above the lowest complete deck and below the main deck is called the *half deck.*

A partial deck *below* the lowest complete deck is called the *platform deck.* When there are two or more partial decks below the lowest complete deck, the one immediately below the lowest complete deck is

called the first platform deck, the next is called the second platform, and so on.

Decks which are for protective purposes are fitted with plating of extra strength and thickness and are defined, for technical purposes, as *protective* and *splinter* in addition to their regular names. Where there is only one such deck, it is defined as *protective* and where there are two, that having the thicker plating is defined as protective, and that having the thinner plating is defined as *splinter,* in addition to the regular names.

Where a protective deck is stepped a complete deck height, the respective portions shall be distinguished by means of the terms "middle protective section" and "forward (after) protective section" in addition to the regular names. Where a splinter deck is stepped a complete deck height, the respective portions are similarly distinguished.

Where a portion of the protective or splinter deck is sloped, the sloping portion is defined as the inclined protective deck or inclined splinter deck.

BULKHEADS

Ships of the Navy are divided into numerous water-tight compartments by decks and bulkheads. The bulkheads running fore and aft are called longitudinal bulkheads, and those running athwartship are called transverse bulkheads. Water-tight doors are fitted in these bulkheads to allow passage from one compartment to another. In certain of the principal bulkheads below the water line no door openings are cut, as it is of vital importance that these bulkheads be water-tight in case of accident admitting water to the adjacent compartments.

PEAK TANKS

Peak tanks are water-tight compartments at the extreme ends of the ship. They are generally fitted with piping and valves so that they can be filled and emptied of water. They are used in case the ship is to be trimmed either by the stern or by the bow. A heavy water-tight bulkhead abaft the forward trimming tank is usually called the collision bulkhead.

QUESTIONS AND ANSWERS

Q. Which is the *bow?*
A. The forward end of the ship.
Q. Which is the *stern?*
A. The after end of the ship.
Q. What is the part known as *midships?*

A. The middle part.

Q. What are the *starboard* and *port* sides?

A. The starboard side is on the right-hand side looking forward; the port side is on the left-hand side looking forward.

Q. What is the *keel?*

A. The lowest center-line longitudinal member; it is the first piece of metal laid on the blocks when building the ship.

Q. What is the *stem?*

A. It is the system of framework, the vertical extension of the keel, in the forward part of the vessel to which the plating is secured forward.

Q. What is the *sternpost?*

A. It is the system of framework, the vertical extension of the keel in the after part of the ship, to which the plating is secured aft.

Q. What are the *frames?*

A. The frames or ribs extend transversely from the keel to form the main thwartship portion of the skeleton to which the outside plating is secured.

Q. What is the *bilge?*

A. The flat part of the ship's body on each side of the keel. It extends out to the turn of the bilge.

Q. What are the *bilge keels?*

A. Large pieces of metal secured outside near the turn of the bilge. They lessen the degree of rolling.

Q. What is the *counter?*

A. The portion of the stern from the water line to the overhang (or the part which projects out over the water).

Q. What is the *water line?*

A. It is a line the water makes along the ship's side when she is afloat in still water.

Q. What is the *run* of a ship?

A. The narrowing of a hull aft, between keel and counter.

Q. What is the *cutwater?*

A. It is the forward edge of the stem; the part that cuts the water when the ship is in motion.

Q. What is a *double-bottom compartment?*

A. Steel ships generally have two complete bottoms over a considerable portion of their extent, the inner and the outer bottoms. The spaces between them are called "double-bottom compartments."

Q. What is a *water-tight compartment?*

A. All steel ships are divided into a large number of rooms and passages that are so fitted as to be water-tight. Each separate compartment is known as a "water-tight compartment." The compartments serve to keep the ship afloat by confining the water if her hull is pierced.

Q. What are the *eyes* of the ship?

A. The extreme forward portion of the ship, where the plating joins the stem.

Q. What are the *wings?*

A. The portion of the hold nearest the side of the ship.

Q. What are the *chain lockers?*

A. Compartments in the forward portion of the vessel under the chain pipes for carrying and storing cables.

Q. What are the *beams* of the ship?

A. Horizontal framing running across the ship to support the decks and connect the sides.

Q. What are the *waterways?*

A. Small gutters extending all around the edge of the weather decks. When the deck is washed down, the waterways carry off the water over the side through the scuppers.

Q. What are the *scuppers?*

A. They are holes in the ship's side through which water is discharged through pipes from the waterways.

Q. What are *partners?*

A. Frames of timber or steel fitted into the decks immediately around the masts to strengthen the decks locally against side pressure of the masts.

Q. What are the *ports?*

A. Openings in the ship's side for various purposes. Air ports are for the admission of air and light. Gun ports are openings through which the guns are pointed and fired. Merchant ships have cargo ports.

Q. What are *stanchions?*

A. Vertical pillars of wood or metal supporting a beam or some other portion of the ship.

Q. What is *calking?*

A. Driving oakum between the planks of a deck; the top portion of the seam is then filled or payed with pitch or marine glue.

Q. What is the *rudder?*

A. The apparatus used to steer a vessel; it hangs on the sternpost, or rudderpost, by pintles and gudgeons.

Q. What is the *tiller?*

A. A piece of timber or metal fitted fore and aft to the head of the rudder stock by which to turn it when steering.

Q. What is the *wheel?*

A. The handwheel used to move the tiller and rudder. With the steam steering gear, the wheel, when turned, opens the valve of the steering engine and the engine moves the rudder through a tiller or a crosshead. The wheel is connected to the valve by shafting and gearing, or by a flexible wire cable, or in some cases by a telemotor (hydraulic piping system). The steam steering gear is now supplanted by electric and by electric-hydraulic systems.

Note.—In all vessels of the Navy the wheel, the rudder, and the ship's head (when moving forward) move in the same direction.

Q. What is the *forecastle,* the *waist,* the *quarter-deck?*

A. In modern days these portions of the ship are not so clearly defined as they were in old sailing ships. Generally speaking, the forecastle extends from the foremast forward on the uppermost deck. The quarter-deck extends from the mainmast to the poop or to the stern if there is no poop. The portion of the upper deck on each side between the forecastle and the quarter-deck is known as the waist.

Note.—Certain battleships have the officers' quarters forward. For this reason and on account of the necessity for ceremonial functions being conducted on the quarter-deck, it is required that the quarter-deck be defined by the captain. Consequently, the *Navy Regulations* say: "The commanding officer shall clearly define the limits of the quarter-deck; it shall embrace so much of the main or other appropriate deck as may be necessary for the proper conduct of official and ceremonial functions."

Q. What is the *break of the forecastle?*

A. The after end of the forecastle.

Q. What is a *hatchway?*

A. An opening in the decks forming a passageway from one deck to another and into the holds.

Q. What is a *coaming?*

A. The raised boundary of hatchways or doors to keep water from going below or entering adjacent compartments.

Q. What are *gratings?*

A. Coverings of latticework for hatchways, waterways, bridges, etc.

Q. What are *deadlights?*

A. Pieces of heavy glass fixed in the deck or ship's side to admit light.

Q. What are *scuttles?*

A. Round or square holes cut in the deck for the passage of coal, ammunition, etc.

Q. What are the *bulwarks?*

A. The planking or plating around the vessel above the upper deck.

Q. What is the *taffrail?*

A. The rail around the vessel's stern.

Q. What are *hawse pipes?*

A. Pipes in the bow of a ship for anchor cables to pass through.

Q. What are *hawse plugs?*

A. Plugs fitted in the hawse pipes to prevent the water from coming on board through them. When made of canvas, stuffed or filled with oakum, they are called jackasses.

Q. What are *bucklers?*

A. Shutters fitted over an opening to confine the packing that is put in holes to keep water out. They keep hawse plugs, for example, from washing inboard.

Q. What is the *manger?*

A. It is the part of the deck that is partitioned off forward on some vessels to prevent any water that may enter through the hawse holes from running aft over the decks.

Q. What are the *chain pipes?*

A. The pipes for the cable where it passes from one deck to another from the chain lockers.

Q. What is a *chain compressor?*

A. The large movable iron lever fixed in the chain pipe. A tackle is secured to its end, and by hauling on the tackle the cable is secured by being nipped between the compressor and the lower part of the chain pipe.

Q. What is a *capstan?*

A. A barrel of wood or steel turning around vertically on a central spindle. By forcing it to turn, either by pushing on capstan bars or by steam, it serves to hoist heavy weights or to weigh anchor.

Q. What are *bitts?*

A. They are vertical pieces of timber or metal very securely fastened to the deck of the vessel. They are used to secure hawsers or for any purpose where heavy strains are to be taken.

Q. What is an *eyebolt?*

A. A bolt with an eye or opening in its head, to which a tackle may be hooked. An eyebolt having a ring welded in the eye is a ringbolt.

Q. What is a *fish boom* or fish davit?

A. A movable boom or davit for fishing the anchor.

Q. What is the *billboard?*

A. A sloping shelf, or edge, on the ship's side to support the old-fashioned type anchor.

Q. What are the *chains?*

A. Platforms projecting out from the ship's side where the leadsman stands to take soundings.

Q. What is the *bridge?*

A. The raised platform extending athwartships in the forward part of the ship, from which the ship is steered and navigated. Amidships and after bridges are sometimes fitted.

Q. What is the *sea ladder?*

A. Steps secured to the ship's side for use in coming on board when the gangway is unshipped. This ladder, as the name indicates, is used chiefly at sea.

Q. What are the *accommodation ladders?*

A. Ladders shipped at the gangway in port for convenience in coming on board.

Q. What is a *gooseneck?*

A. It is the steel attachment fitted in the end of a boom securing the same and allowing it vertical and lateral motion at the same time.

Q. What are *davits?*

A. Curved metal spars projecting over the ship's side, used for hoisting heavy articles or weights, such as boats or stores; also at hatches for ammunition, etc.

Q. What are *hammock cloths?*

A. Pieces of canvas for covering the openings to the hammock nettings.

Q. What are *hammock nettings?*

A. Spaces in which hammocks are stowed when not in use.

Q. What is the *galley?*

A. The cooking compartments on board ship.

Q. What is a *magazine?*

A. A place where powder or shell is stowed.

Q. What is a *shell room?*

A. A magazine where shell is stowed.

Q. For what purpose are *draft numbers* placed on the bow and on the stern?

A. To show the draft of the ship at any time.

Q. How is the *draft* determined by these figures?

A. The bottom of each figure marks the exact number of feet from the bottom of the keel; the tops of the figures indicate the half feet. The rest is estimated by the eye. For example, the bottom of the figure 9 is exactly 9 feet from the bottom of the keel. The top of the figure 9 is exactly 9 feet 6 inches from the bottom of the keel.

Q. What are the *holds, storerooms, wardroom, cabin, sick bay?*

A. The term "hold" is a general term to denote the lower stowage compartments of a ship. Storerooms are located in various parts of the ship; they are used for stowing the various stores. The cabin is the quarters of the captain or the admiral; wardroom, the quarters of all officers junior to the captain, except the junior officers and warrant officers, who occupy the junior officers' and warrant officers' quarters, respectively. The sick bay is the hospital of the ship.

Q. What is *nonshatterable glass?*

A. One type is a single layer of glass, one face of which has received a coating of transparent elastic material. Another type has this transparent elastic material between two layers of glass.

Q. What precautions should be used with this glass?

A. Never use alcohol or solid washing compounds on the treated surface. Avoid handling the treated face with bare hands.

Q. How are bulkheads shored up in case of damage?

A. Brace all shores against material running as nearly as practicable at right angles to the bulkhead to be supported. Do not brace one bulkhead by shoring to another unless there are supporting structures to distribute the load. Aim to shore bulkhead to a deck, or vice versa. In general, the bulkhead stiffeners are the members to be braced.

Q. What are the *tonnage rules?*

A. There are five kinds of tonnage in use in the shipping business. They are dead-weight, cargo, gross, net, and displacement tonnages.

(1) *Dead-weight tonnage* expresses the number of tons (of 2,240 pounds) of cargo, stores, and bunker fuel that a vessel can transport. It is the difference between the number of tons of water a vessel displaces "light" and the number of tons it displaces when submerged to the load water line. Dead-weight tonnage is used interchangeably with dead-weight carrying capacity. A vessel's capacity for weight cargo is less than its total dead-weight tonnage.

(2) *Cargo tonnage* is either "weight" or "measurement." The weight ton in the United States and in British countries is the English long or

gross ton of 2,240 pounds. In France and other countries having the metric system a weight ton is 2,204.6 pounds. A "measurement" ton is usually 40 cubic feet, but in some instances a larger number of cubic feet is taken for a ton. Most ocean package freight is taken at weight or measurement (W/M), ship's option.

(3) *Gross registered tonnage* applies to vessels, not to cargo. It is determined by dividing by 100 the contents, in cubic feet, of the vessel's closed-in spaces. A register ton is 100 cubic feet. The register of a vessel states both gross and net tonnage.

(4) *Net registered tonnage* is a vessel's gross tonnage minus deductions of space occupied by accommodations for crew, by the propelling power plant, fuel, and spaces necessary for operating the vessel. A vessel's net tonnage expresses the space available for the accommodation of passengers and the stowage of cargo. A ton of cargo in most instances occupies less than 100 cubic feet; hence the vessel's cargo tonnage usually exceeds its net tonnage, and may in some instances exceed the gross tonnage.

(5) *Displacement* of a vessel is the weight, in tons of 2,240 pounds, of the vessel and its contents. Displacement "light" is the weight of the vessel without stores, bunker fuel, or cargo. Displacement "loaded" is the weight of the vessel plus cargo, fuel, and stores.

Example.—For a modern freight steamer the following relative tonnage figures would ordinarily be approximately correct:

Net tonnage	4,000
Gross tonnage	6,000
Dead-weight carrying capacity	10,000
Displacement, loaded, about	13,350

CHAPTER 24

G—GENERAL FEATURES OF SHIPS OF THE NAVY

Type classification 188
Features of different types of ships 189

TYPE CLASSIFICATION

Type	Class
Battleship	Battleship.
Cruiser	Heavy cruiser.
	Light cruiser.
Aircraft carrier	Aircraft carrier.
Destroyer	Destroyer.
	Destroyer leader.
Submarine	Submarine.
	Mine-laying submarine.
Mine vessel	Mine layer.
	Light mine layer.
	Mine sweeper.
Patrol vessel	Eagle.
	Submarine chaser.
	Gunboat.
	River gunboat.
	Yacht.
Auxiliary	Tenders for destroyers, submarines, aircraft.
	Repair ships.
	Provision storeships.
	Oilers.
	Ammunition ships.
	Hospital ships.
	Cargo ships.
	Transports.
	Ocean-going tugs.
	Miscellaneous.
District craft	Boats, barges, derricks, dredges, ferryboats, lighters, tugs, etc.
Aircraft (heavier-than-air)	Bombing, observation, fighting, torpedo, scouting, patrol, utility, training, experimental.
Airship (lighter-than-air)	Rigid airship, nonrigid airship, kite balloon and balloon, experimental.

FEATURES OF DIFFERENT TYPES OF SHIPS

Battleships are heavily armored, carry heavy armament, and are of moderate speed of about 20 knots. They are designed to fight any vessel anywhere.

All battleships have a large fuel capacity and a long cruising radius. All battleships are heavily armored on the water line, and carry thick armor in the barbettes leading up to the turrets, thick armor in tubes leading up to the conning and fire-control towers, and thick armor in wake of the uptake space of smoke pipes. All turrets are heavily armored. A heavy protective deck of special steel covers the vitals of the ship. Besides this armor, battleships are protected by having double bottoms split up into numerous water-tight subdivisions. All vital parts of the ship are divided into numerous water-tight compartments so that these parts can be flooded without seriously affecting the other parts. In the latest ships there are further subdivisions, called "blisters," for protection against torpedoes.

The general features of our battleships are as follows:

Maryland, Colorado, and West Virginia.—Length, 624 feet; beam, 97 feet 6 inches; all-electric drive; 28,900 horsepower; speed, 21 knots; 4 screws; displacement, 32,600 tons; carry eight 16-inch, 45-caliber guns in 4 turrets twelve 5-inch, 51-caliber secondary battery; eight 5-inch, 25-caliber anti-aircraft battery.

California and Tennessee.—Length and beam same as *Maryland* class. Both electric drive; 29,600 horsepower; speed, 21 knots, 4 screws; displacement, 32,300 tons; carry twelve 14-inch, 50-caliber guns in 4 turrets; twelve 5-inch, 51-caliber secondary battery; eight 5-inch, 25-caliber anti-aircraft battery.

New Mexico, Idaho, and Mississippi.—Length, 624 feet; beam, 106 feet 3¼ inches. All three vessels have Parsons turbines, 40,000 horsepower, 4 screws, 21 knots. Displacement, 33,000 tons. Same armament as *California* class.

Pennsylvania and Arizona.—Length, 608 feet; beam, 106 feet 3 inches. *Pennsylvania* has Curtis turbines, 33,376 horsepower, 4 screws, 21 knots. Displacement, 33,100 tons. *Arizona* has Parsons turbines, 34,000 horsepower, 4 screws, 21 knots. Displacement, 30,600 tons. Same armor and armament as *California* class.

Oklahoma and Nevada.—Length, 583 feet; beam, 107 feet 11 inches. *Oklahoma* has triple-expansion reciprocating engines, 25,300 horsepower, 2 screws, 20½ knots. *Nevada* has Parsons turbines, 25,000 horsepower, 2 screws, 20½ knots. Displacement of both ships, 29,000

tons. Armament, ten 14-inch, 45-caliber guns in 4 turrets; twelve 5-inch, 51-caliber secondary battery; eight 5-inch, 25-caliber anti-aircraft.

New York and Texas.—Length, 573 feet; beam, 106 feet 1 inch. Both have triple-expansion reciprocating engines, 28,100 horsepower,

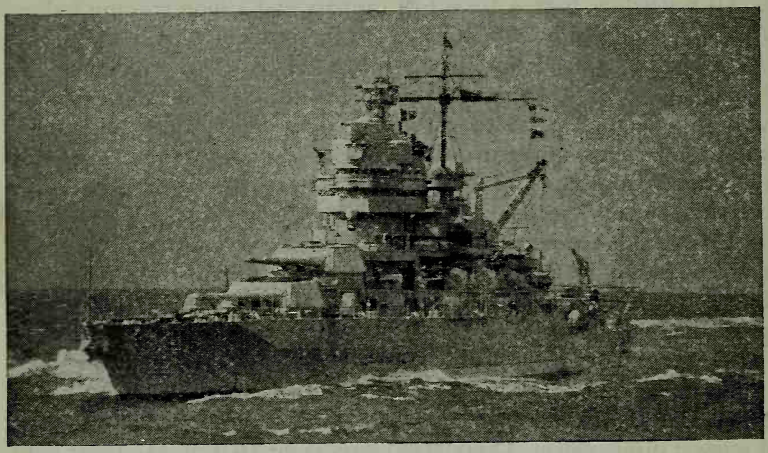


FIG. 24-1—Battleship U. S. S. *Idaho.*

2 screws, 21 knots. Displacement, 27,000 tons. Armament, ten 14-inch, 45-caliber guns in 5 turrets; sixteen 5-inch, 51-caliber secondary battery; eight 3-inch, 50-caliber anti-aircraft battery.

Arkansas.—Length, 562 feet; beam, 106 feet 1 inch. Has Parsons turbines, 30,000 horsepower, 4 screws, 21 knots. Displacement, 26,100 tons. Armament, twelve 12-inch, 50-caliber guns in 6 turrets; sixteen 5-inch, 51-caliber secondary battery; and eight 5-inch, 50-caliber anti-aircraft guns.

Cruisers are lightly armored, carry moderate armament, and are of high speed, about 34 knots. Ships with guns greater than 6 inches are known as heavy cruisers, while those with guns 6 inches or less are known as light cruisers. All cruisers have an extremely large fuel capacity in order to maintain high speed for a long period. Cruisers, like battleships, are divided into numerous water-tight compartments.

Heavy Cruisers

Minneapolis. Astoria, New Orleans, Tuscaloosa, San Francisco. Quincy, Vincennes, Wichita.—Length, 588 feet; beam, 61 feet 10

inches. All have Parsons turbines, 107,000 horsepower, 4 screws, 32½ knots. Displacement, 10,000 tons. Armament, nine 8-inch, 55-caliber guns in 3 turrets; eight 5-inch, 25-caliber anti-aircraft guns.

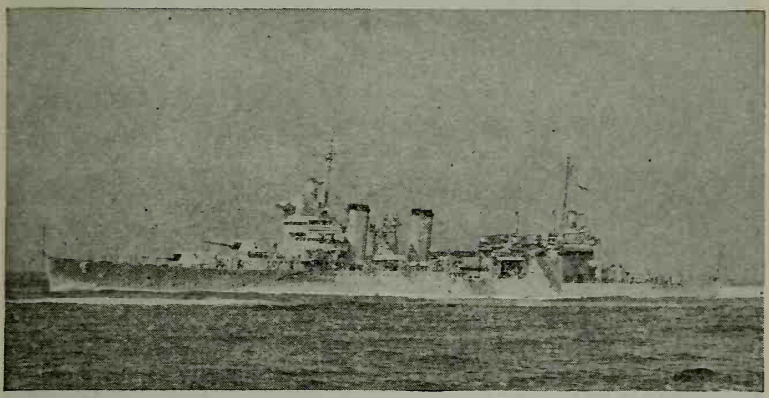


FIG. 24-2—Heavy cruiser U. S. S. *Tuscaloosa.*

Portland and Indianapolis.—Length 610 feet 3⅜ inches; beam, 66 feet ⅞ inch. Other characteristics the same as for the *Minneapolis* class.

Augusta, Houston, Chester, Louisville, Chicago, Northampton.—Length, 600 feet; beam, 65 feet. Parsons turbines, 107,000 horsepower, 4 screws, 32.7 knots. Displacement, 9,050 tons. Armament, nine 8-inch, 55-caliber guns in 3 turrets; four 5-inch, 25-caliber anti-aircraft guns; two 21-inch triple torpedo tubes.

Salt Lake City and Pensacola.—Length, 585 feet 6 inches; beam, 65 feet 3 inches. Both vessels have Parsons turbines, 107,000 horsepower, 4 screws, 32.7 knots. Displacement, 9,100 tons. Armament, ten 8-inch, 55-caliber guns in 4 turrets; four 5-inch, 25-caliber anti-aircraft guns; two 21-inch triple torpedo tubes.

Light Cruisers

Brooklyn, Philadelphia, Savannah, Nashville, Phoenix, Boise, Honolulu, St. Louis, and Helena.—Length, 608 feet 4 inches; beam, 61 feet 7 inches. Turbines with reduction gear, 95,000 horsepower, 4 propellers, 32½ knots. Displacement, 10,000 tons. Armament, fifteen 6-inch, 47-caliber guns in 5 turrets; eight 5-inch, 25-caliber anti-aircraft guns.

Omaha, Trenton, Richmond, Raleigh, Milwaukee, Memphis, Marble-

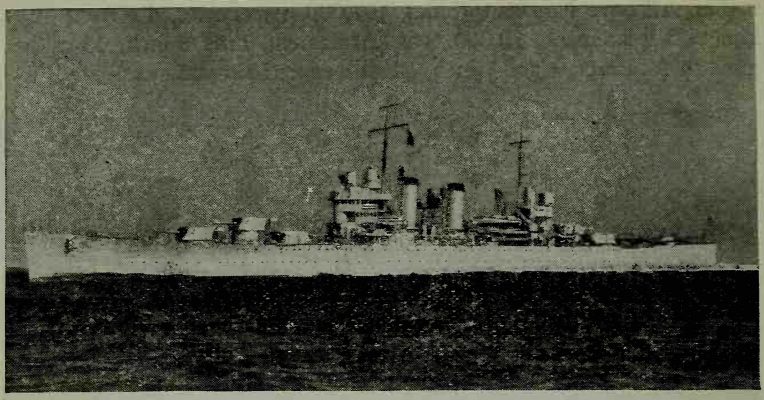


FIG. 24-3 (*a*)—Light cruiser U. S. S. *Boise*.

head, Detroit, Concord, and Cincinnati.—Length 555 feet; beam, 55 feet 4 inches. All have turbines with reduction gears, 90,000 horsepower, 4 screws, 34 knots. Displacement 7,500 tons. Armament, ten or twelve (depending upon alteration) 6-inch, 53-caliber guns; four 3-inch, 50-caliber anti-aircraft guns; two 21-inch triple torpedo tubes.

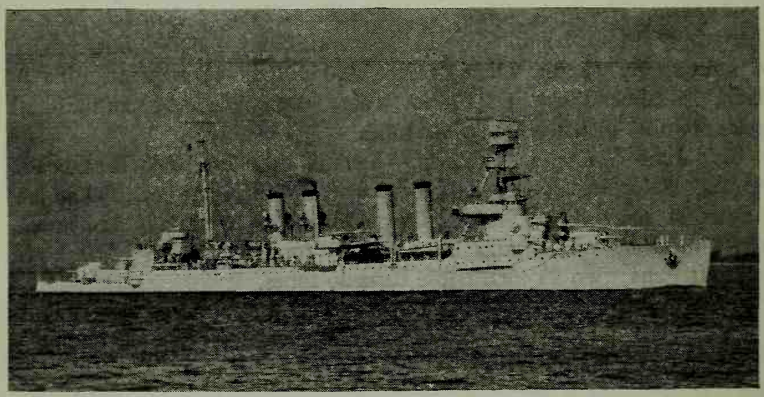


FIG. 24-3 (*b*)—Light cruiser U. S. S. *Milwaukee*.

Aircraft carriers.—These are large, speedy ships designed to carry aircraft, with the top deck for airplanes to take off and land.

Saratoga and Lexington.—Length 888 feet; beam, 106 feet. Electric drive, 180,000 horsepower, 4 propellers, 34 knots. Displacement 39,000 tons. Armament, eight 8-inch, 55-caliber guns and twelve 5-inch, 25-caliber anti-aircraft guns.

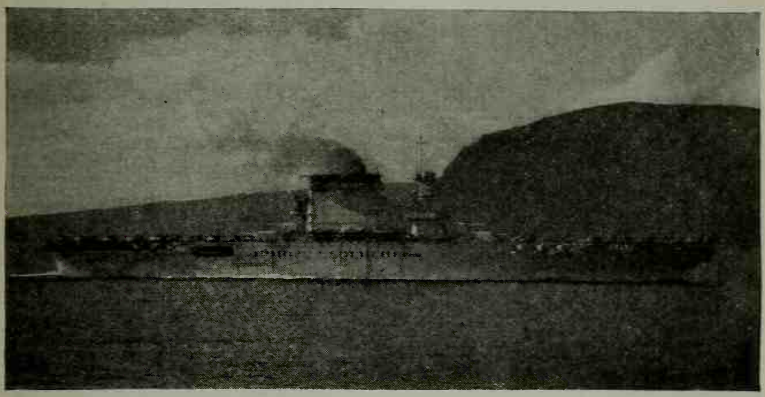


FIG. 24-4—Aircraft carrier U. S. S. *Lexington.*

Ranger.—Length, 769 feet; beam, 80 feet. Turbines with reduction gear, 53,500 horsepower, 2 propellers, 29¼ knots. Displacement 14,500 tons. Armament, eight 5-inch, 25-caliber guns.

Yorktown and Enterprise.—Length, 809 feet; beam, 83 feet. Turbines with reduction gear, 120,000 horsepower, 4 propellers, 32½ knots. Displacement 20,000 tons. Armament, eight 5-inch, 38-caliber guns. The *Hornet* of this class is building.

Wasp.—Approximately the same class as the *Ranger.*

Destroyers

Porter class (Flotilla leaders).—Length, 372 feet; beam, 36 feet 3 inches. Turbines with reduction gear, 50,000 horsepower, 2 propellers, 37 knots. Displacement 1,850 tons. Armament, 4 twin 5-inch, 38-caliber guns; 2 quadruple 21-inch torpedo tubes.

Farragut class.—Length 341 feet 3 inches; beam, 34 feet 2 inches. Turbines with reduction gear, 42,000 horsepower, 2 screws, 36.5 knots. Displacement 1,500 tons. Armament, five 5-inch, 38-caliber guns; 2 quadruple 21-inch torpedo tubes.

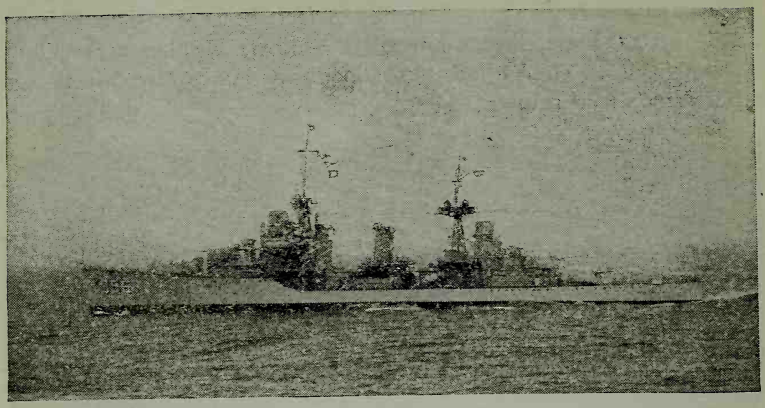


FIG. 24-5—Destroyer flotilla leader U. S. S. *Porter*.

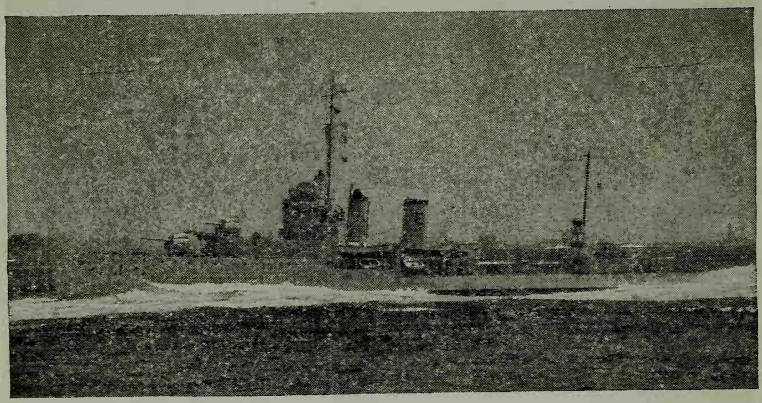


FIG. 24-6—Destroyer U. S. S. *Farragut*.

Flush deck type and destroyers similar to the U. S. S. *Tattnall*.—Length, about 310 feet; beam, about 30 feet 6 inches. Turbines, 27,000 horsepower, 2 screws. Displacement about 1,250 tons. Armament, four 4- or 5-inch guns and 4 triple torpedo tubes.

Mine Vessels

Mine layers.—These are specially designed ships for laying mines. They have moderate speed and carry a small battery. They carry special equipment for dropping mines over their sterns, and are designed to carry anywhere from 50 to 600 mines.

Light mine layers.—*Breese* class.—Characteristics similar to destroyers (1,250-ton type), except that they are equipped especially to carry mines and drop them over the stern.

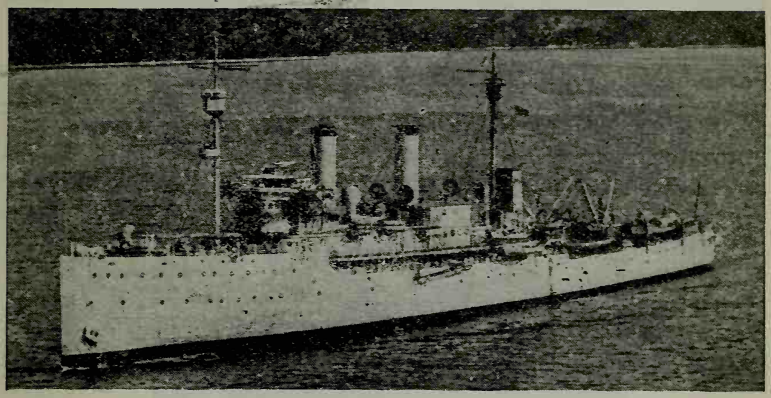


FIG. 24-7—Mine layer U. S. S. *Aroostook*.

Mine sweepers.—Small vessels especially equipped with cables for the sweeping of mines.

Submarines are especially designed to operate under the surface. For this purpose they are fitted with ballast tanks which, when flooded, cause the submarine to float with just a few hundred pounds bouyancy. They are then submerged by going ahead with their electric motors, and operating their diving rudders. When operating submerged they use electric motors which are supplied power from storage batteries. On the surface they use Diesel engines. Our larger submarines are designed to

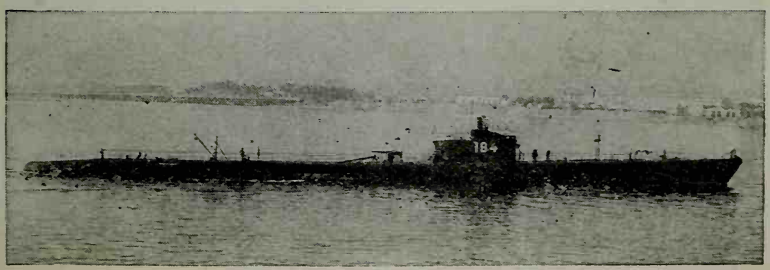


FIG. 24-8—Submarine U. S. S. *Skipjack*.

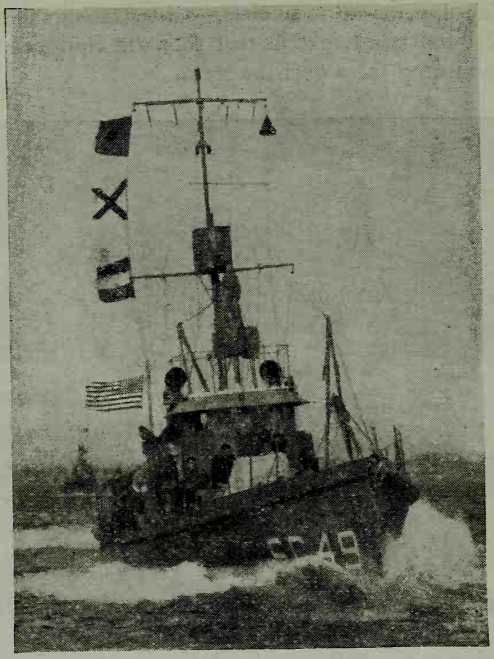


FIG. 24-9—Submarine chaser U. S. S. *SC-49*

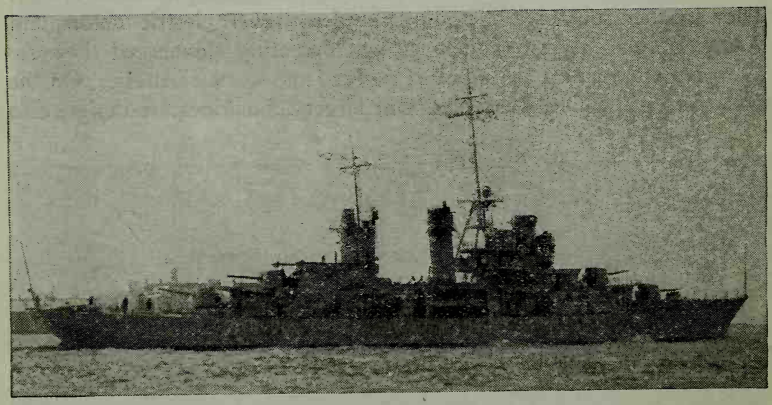


FIG. 24-10—Gunboat U. S. S. *Erie.*

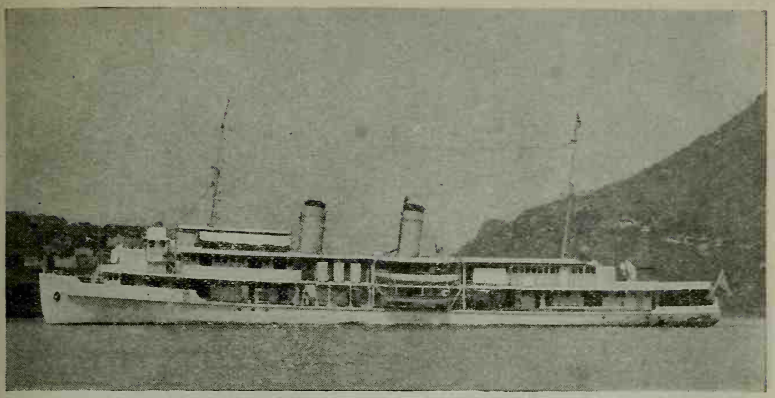


FIG. 24-11—River gunboat U. S. S. *Mindanao*.

accompany the fleet on extended cruises, and have quite a long cruising radius. The other submarines have a maximum of about 14 knots speed and are designed primarily to operate from bases.

Patrol vessels.—Submarine chasers, Eagle boats, yachts, and gunboats are known as patrol vessels. They are small, unarmored, and in most cases have a small battery. They are of moderate speed and are designed, as their names indicate, for patrol work, or for special purposes.

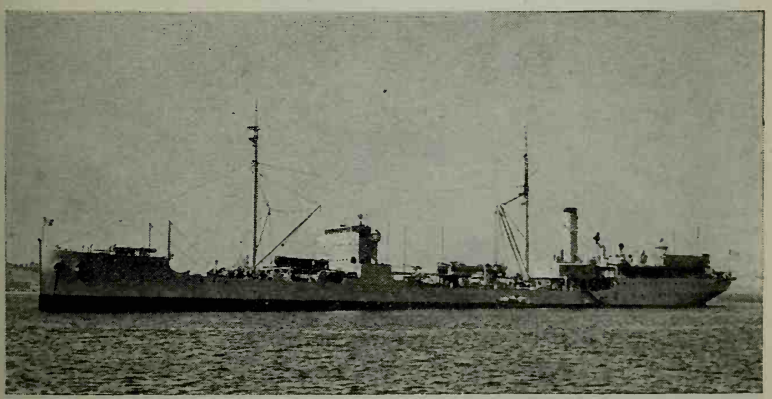


FIG. 24-12—Fleet oiler U. S. S. *Neches*.

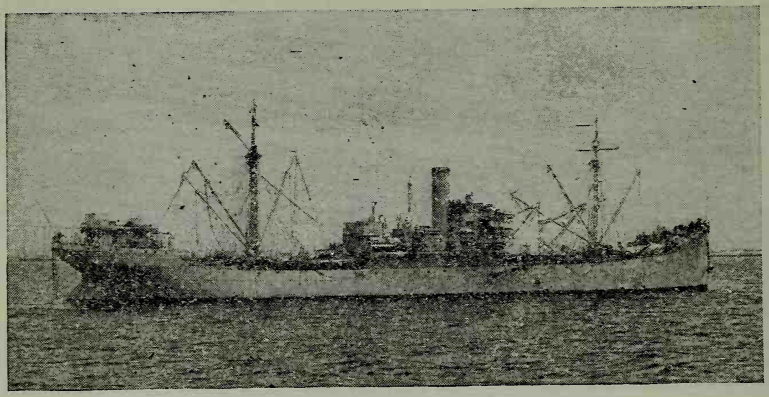


FIG. 24-13—Provision storeship U. S. S. *Arctic*.

Auxiliaries.—The classes of auxiliaries are self-explanatory as to the duty on which these vessels are employed. The characteristics of this class of ship differ from each other so radically that it is not practicable to give detailed information here; however, men attached to this type of vessel should become familiar with all the characteristics of their vessel.

Aircraft.—The names of the classes of aircraft are self-explanatory as to the functions of each class. Aircraft are in such a state of rapid development at the present time that it is hardly practicable to go into

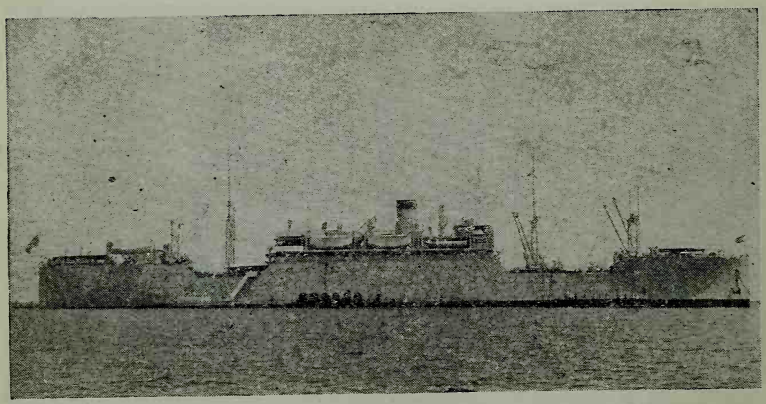


FIG. 24-14—Navy transport U. S. S. *Chaumont*.

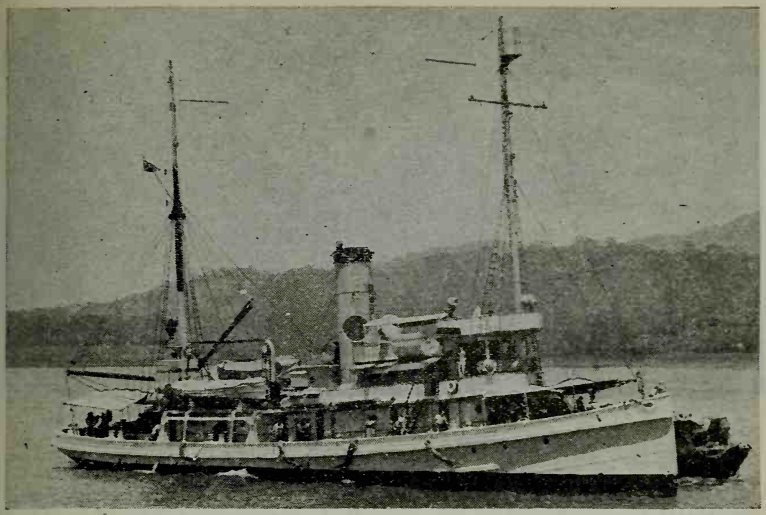


FIG. 24-15—Tug (Indian class), U. S. S. *Allegheny*.

any detailed description of any of the planes. Observation, fighting, bombing, torpedo, and scouting planes are the usual types carried on board various vessels. The other classes of planes usually remain at shore stations.

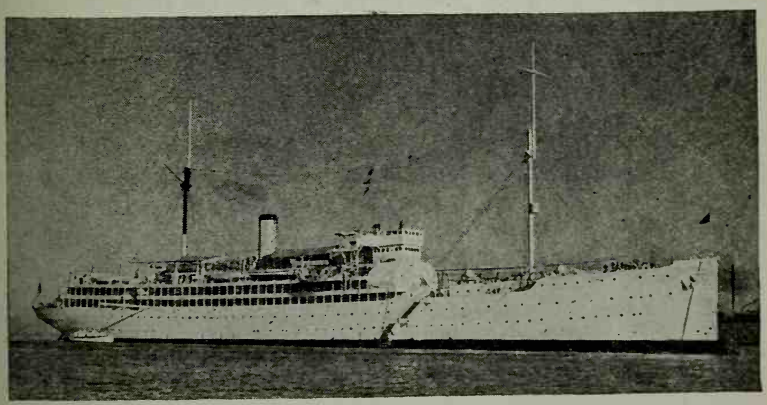


FIG. 24-16—Hospital ship U. S. S. *Relief*.

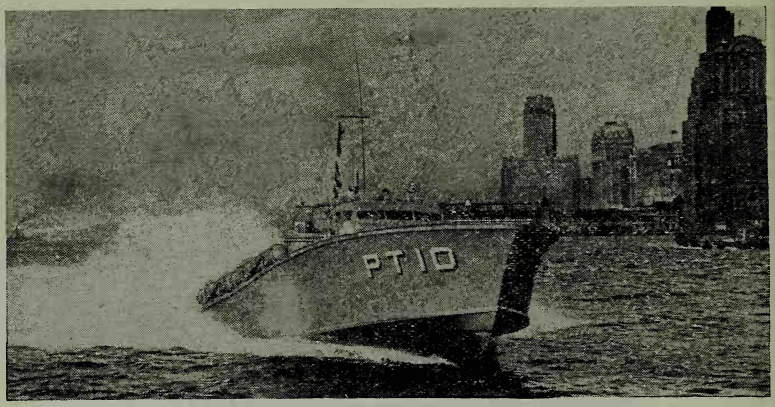


FIG. 24-17—Torpedo boat, *PT-10*.

Planes are flown on and off the flying deck of aircraft carriers. All our battleships and cruisers are supplied with catapults for launching planes. These vessels carry from 2 to 8 planes, but this number is subject to change as development of aircraft and shipbuilding progresses.

CHAPTER 25

H—EVENTS IN THE DAILY ROUTINE

Daily routine in port 201
Daily routine at sea 202
Notes on routine 204
Messes 209
Watches and divisions 209
Scrubbing and cleaning 210
Smoking hours 211
Lucky bag 212
Ship's orders 212
Miscellaneous information 212

DAILY ROUTINE IN PORT

0400. Call ship's cooks of the watch.
0445. Call police petty officers, boatswain's mates, buglers, and hammock stowers.
0500. Reveille; call all hands, pipe *Up hammocks,* serve out coffee; light the smoking lamp.
0515. Haul over hammock cloths and stop them down; police petty officers report decks clear of hammocks.
0520. Pipe sweepers; sweep down thoroughly before decks are wet.
0525. Off shoes and socks, or put on boots, according to weather conditions; get out wash-deck gear.
0530. Turn to; out smoking lamp; execute morning orders; clear lower decks. Five minutes before sunrise station men for turning off anchor, boom, and gangway lights; scrub clothes.
0600. Knock off scrubbing clothes; trice up lines.
0645. Take off gun covers and hatch hoods, unless the weather is foul; hammock stowers haul back hammock cloths.
0700. Up all hammocks.
0715. Mess gear; light smoking lamp; publish uniform of the day.
0730. Breakfast.
0800. Colors.
0815. Turn to; out smoking lamp; deck and gun bright work.
0830. Sick call.
0845. Retreat from bright work; sweep down; stow away all wash-deck gear; clear up the deck for quarters.

0910. Officers' call; divisions fall in for muster.
0915. Quarters for muster and inspection; physical drill, followed by the drill prescribed.
1130. Retreat from drill; pipe down scrubbed clothes, if dry; sweep down; light smoking lamp; mast for reports and requests.
1145. Mess gear.
1200. Dinner.
1230. Band call; band concert till 1300.
1300. Turn to; out smoking lamp; pipe sweepers; pipe down aired bedding, if up; pipe down washed clothes, if dry.
1330. Drill call.
1430. Retreat from drill; turn to.
1600. Knock off work; pipe down scrubbed clothes, if up; sweep down; light smoking lamp.
1630. Lay aft the liberty party.
1730. Clear up decks.
1745. Mess gear.
1800. Supper. Five minutes before sunset call guard of the day and band; station detail for all lights; turn on lights at sunset.
1830. Turn to; pipe sweepers; wet down decks for scrubbing clothes.
1930. Hammocks; no smoking below the main decks.
2000. Muster the anchor watch; searchlight and signal drills if ordered.
2030. Trice up the clotheslines.
2055. First call; out smoking lamp.
2100. Tattoo; pipe down; silence; muster and set first anchor watch.
2105. Taps.

DAILY ROUTINE AT SEA

0200. Relieve wheel and lookouts.
0350. Call the watch section.
0400. Relieve the watch; muster the watch section and lifeboat's crew: light smoking lamp; call ship's cooks of the watch. Five minutes before sunrise station details at running light; turn off at sunrise; relieve lookouts and station masthead lookouts.
0500. Call idlers and section of the watch sleeping in; coffee.
0520. Pipe sweepers.
0530. Turn to; out smoking lamp; execute morning orders.
0600. Relieve the wheel and lookout; trice up clotheslines.
0645. Hammock stowers haul back hammock cloths.
0700. Up all hammocks.

0715. Hammock stowers stop down hammock cloths; mess gear; light smoking lamp.
0730. Breakfast; shift into the uniform of the day during the meal hour.
0800. Relieve the watch (both sections on deck); muster watch and lifeboat's crew.
0815. Turn to; out smoking lamp; deck and gun bright work.
0830. Sick call.
0845. Knock off bright work; sweep down; stow away wash-deck gear; take down towel line; clear up decks for quarters.
0910. Officers' call; divisions fall in for quarters.
0915. Quarters for muster and inspection; physical drill, and drills as prescribed.
1000. Relieve the wheel and masthead.
1030. Retreat from drill; pipe down washed clothes, if dry; sweep down.
1145. Mess gear.
1200. Dinner.
1230. Relieve the watch; band call.
1300. Turn to; pipe sweepers; out smoking lamp.
1315. Drill call, if ordered.
1400. Relieve the wheel and lookout.
1415. Retreat from drill; pipe sweepers; turn to.
1530. Pipe down washed clothes, if up.
1600. Relieve the watch; muster watch and lifeboat's crew.
1630. Sweep down, knock off ship's work; light smoking lamp. Five minutes before sunset station detail at running lights; turn on running lights with senior ship present; station bridge lookouts; muster lifeboat's crew; inspect lifeboats.
1730. Clear up decks.
1745. Mess gear.
1800. Supper; relieve the wheel and lookout.
1930. Turn to; sweep down; wet down decks for scrubbing clothes.
1900. Band concert for crew until 2000.
1930. Hammocks; no smoking below deck.
2000. Call the watch; relieve the wheel and lookout; relieve the watch; muster watch and lifeboat's crew; turn out all but standing lights and lights in officers' quarters and chief petty officers' mess room.
2100. Out smoking lamp; turn out lights in C.P.O. mess room.

2200. Relieve the wheel and lookout; turn out lights in officers' quarters unless an extension has been granted.
2350. Call the watch.
2400. Relieve the watch; muster the watch and lifeboat's crew.

The foregoing routines are generally used by all ships in our Navy. Special conditions may cause variations in the time when some of these duties are performed, and special types of ships will not be required to perform all the duties enumerated, but these are samples of routine generally in use.

NOTES ON ROUTINE

Reveille.—The buglers sound *reveille* with the stroke of the bell, if occurring on the hour or half hour. The boatswain's mates, in concert, pipe their call *All hands,* and get the crew turned out quickly. The police petty officers make rounds to see that all men are out promptly and are dressed and are lashing hammocks. The cooks, who have been called earlier, get coffee ready for serving out to the different divisions. Ten minutes are allowed from reveille until all hammocks are stowed.

Six-bell hammocks.—Certain men who have had night watches are allowed to sleep until 0700. Some men also who have been up late on duty may obtain permission from the officer of the deck to sleep in. When these 6-bell hammocks are stowed, the hammock cloths are stopped down for the day, and the nettings are afterwards entered only by permission of the officer of the deck.

Turn to is the signal for work to begin. On special occasions, such as provisioning ship, painting ship, etc., the time of *Turn to* may vary greatly; the time is always specified in the "morning orders" of the executive officer. Smoking ceases; the smoking lamp is put out; work begins; sweepers are piped; gear is laid up off the deck to keep dry, if decks are to be scrubbed; and preparations for cleaning ship are made.

Piping sweepers is a call sounded by the boatswain's mate as an order for the men of the various divisions who are detailed as sweepers to get their brooms and sweep down the parts of the ship assigned them. Sweeping should always be done before morning work in order to remove loose dirt and have a clean deck for scrubbing clothes. The sweepers should sweep every part of the deck, particularly all corners. Men must always make way for sweepers. The petty officers of the various parts of the ship are particularly charged with the thoroughness of this duty. The sweepings should never be swept into a scupper, but

always into a dustpan, and then they should be thrown into the trash or slop chute. During the daily routine when sweepers are piped, orders are given to "Clean out all the spit kits and wipe off all ladders." The spit kits are taken to the head, emptied, and washed out, and about 1 inch of water put in them before they are returned to their places. All ladders in the ship should be wiped off with a damp swab.

Washing decks.—The various parts of the ship are wet down with clean salt water. This is accomplished by use of small rubber wash-deck hose led from hydrants on the fire main. Every part of the deck is wet down thoroughly. While washing decks, if the temperature permits, the crew will take off shoes and socks. In cold weather rubber boots are worn while washing down. If it is a morning for scrubbing, the boatswain's mates pipe and call *Scrub and wash clothes,* or *Scrub hammocks* (bags, blankets, or mattress covers) ; otherwise the word is immediately passed *Scrub down the deck* or *Scrub down the deck with sand, Clean all paint work.* When holystoning decks, too much sand is usually used. A thin sprinkling of sand is much more efficient and is more easily removed when washing down. For washing down, long bristle scrub brushes are used. Care must be taken to get into every nook and corner and wash all dirt, sand, and soap off the deck into the scuppers. Corn brooms should never be used on a wet deck as they are immediately ruined. When the word *Dry down the deck* is passed, men with squilgees form abreast and go down the deck shoving the water before them. The squilgee gets most of the water off the deck. A swab is used in the wake of the squilgee to wipe up the remainder and to remove water from corners and deck sockets.

Liberty is usually granted by watches, each watch alternating liberty on week days and alternating 48-hour liberties on week-ends. Special liberty is granted men by the executive officer at his daily "mast for requests" at 1130. Men must see their division officers before going to the executive for special liberty. Liberty parties are called aft at the proper time by the officer of the deck, and he inspects them carefully for cleanliness and uniform before allowing them to leave the ship. Men wearing soiled uniforms or incomplete uniform, or having shoes not shined, or having hair not cut properly, or not properly shaved will not be permitted to go on liberty. The method of making out liberty lists varies on different classes of ships, and men must learn the system in use on their ship.

Hammocks.—At the call of *Hammocks,* all hands go immediately to the nettings where their hammocks are stowed. The hammock stowers

undo the stops of the hammock cloths. The police petty officers inspect to see that all hands are standing by the nettings and then report to the officer of the deck. The officer of the deck orders the boatswain's mate of the watch to pass the order *Trice up the hammock cloths.* The hammock stowers carry out the order. The officer of the deck then orders *Pipe down hammocks.* The boatswain's mate sounds the pipe-down call and all hands get their hammocks.

First call, tattoo, and taps.—First call is sounded at 2055 and is the signal for out smoking lamp and for all hands to get ready for turning in. Tattoo is sounded at 2100 and is a signal for all hands to turn in and keep silence about the decks. There is no excuse for men to be roaming about the decks or answering calls of nature after this call. Taps are sounded at 2105. No one is allowed out of hammocks after taps except for urgent calls of nature or other important reasons.

Bright work is a term applied to all metal objects, whether steel or brass, that are to be kept bright by polishing. Bright-work polish should be used sparingly and all trace of it carefully removed after polishing. Care must be taken not to leave stains on the paint work or gasket. In polishing brass dogs, care must be taken not to cause undue wear on the threads. Emery cloth must not be used on working parts, such as dogs, clips, etc., of water-tight doors. The metal gasket strips on water-tight doors must not be removed for shining, as the holding-down screws are frequently lost or the strips improperly replaced. On gun bright work the use of emery cloth is strictly forbidden except when used under the immediate direction of the battery officer.

Note.—Bright-work gear must be carefully stowed in the place set aside for it immediately after knocking off bright work. The rags and polish should not be stowed in voice tubes or left about the decks.

Sick call is sounded at 0830. If sick, men report to the sick bay at this time. In case of accident or serious illness men may report to the sick bay at any time. The doctor is the only one on board who can excuse men from duty on account of illness. Concealing a disease is a serious offense, as men thereby expose their shipmates to it. Feigning sickness in order to escape duty is also a serious offense. This offense is unmilitary, dishonest, involves lying, and may be punished by court-martial.

Quarters and drill.—Morning quarters usually are held at 0915. The signal for quarters is the *assembly* sounded on the bugle. *Officers' call* is sounded 5 minutes before the *assembly.* Men of the various divisions fall in for muster in the respective parts of the ship assigned

them. The division officer inspects the men, especially as regards neatness and cleanliness. Clean clothes must always be worn to quarters. Men must be carefully shaved and neat in every respect. The division is mustered by the petty officers in charge of sections. The division officer then reports to the head of his department. Meanwhile the division may be allowed to "rest," but if the division officer or a petty officer has not given this order absolute silence in ranks must be maintained, and if the order *at ease* has not been given, men must stand at the position of "attention" and maintain absolute silence. Carelessness or unmilitary bearing of men at quarters is a sign of careless, unmilitary, and, often, an inefficient division on board ship.

After quarters, setting-up exercises are held, after which the men are dismissed in order to get into uniform for the drill which is to follow. All men should have a uniform handy, either in their bag or locker, so that they can shift into the proper uniform for drill in a few minutes. When drill call is sounded, men go to their stations for drill on the double and maintain silence. A slow and noisy division cannot be other than a very inefficient division. Drills are held to train all hands into an efficient fighting unit. All drills have this one mission in view. If all hands fail to act at drill as they should act in a time of great emergency, they will be found wanting at this emergency.

Members of the Engineer Department, except the auxiliary watch, usually muster at their station in working clothes at 0815 on work days and proceed immediately with their work. They attend the *all hands* drills, such as general quarters, fire, collision, and abandon-ship, and proceed immediately with their overhaul and cleaning work after *secure*. The members of the auxiliary watch not on duty fall in at quarters in the uniform of the day.

Setting up.—The primary object of the setting-up exercise is to increase and maintain the development and suppleness of a man's muscles and to correct the most common physical defects that result from the neglect of systematic exercise. Every man should take pride in his physical condition; he should learn the correct position of the trunk, head, chest, and shoulders. Careful and conscientious work during a few minutes setting-up drill will correct stooping and rounding shoulders, strengthen the back and abdominal muscles, and increase the lung capacity.

Musters and inspections.—For general musters, divisions fall in at quarters and are marched by their division officers to the quarter-deck. The officers then turn their divisions over to the senior petty officers

of the divisions and form line on the starboard side of the quarter-deck. The reading of all general orders and communications affecting men, sentences of courts-martial, the presentation of medals, etc., take place with the crew in this formation. Once every month the "Articles for the Government of the Navy" are read.

Inspection by division officers is held at all quarters for cleanliness of uniform and person. On Saturday the uniform is usually "dress," and men should wear the best they have and be scrupulously clean and neat in appearance. After the division officer inspects and reports to his head of department, ranks are opened and the front rank is faced about and dressed. When the captain approaches in the course of his inspection, the order *Hand salute* is given. Every man salutes with his right hand, keeps hand at salute until the order *Two,* and then drops hand smartly to the side. The captain then inspects the division.

The division officers and petty officers inspect all parts of their ship except double bottoms every day for cleanliness. The first lieutenant also inspects all parts of the ship daily for cleanliness, neatness, and upkeep. The captain and executive inspect all lower decks once a week, usually on Friday, and the upper decks every Saturday. When every man does his share to prevent dirt and all men clean their stations, it is an easy matter to pass all these inspections. However, this ideal condition is seldom obtained, and this work which should never be hard is often an endless and seemingly a hopeless task. Every man has some cleaning station. If everyone helps him to keep it clean, the ship will soon be spotless, and, what is more, but little work will be necessary to keep it so.

Admiral's inspections are held twice a year. One is for the semi-annual inspection in which the battle-efficiency inspection is added. The other is the annual inspection which includes all drills as well as everything given in the semi-annual inspection. It should be the ambition of all hands to pass a good admiral's inspection. These inspections will show how your ship compares with the others; how you, yourself, compare with the other sailors on those ships. When the admiral can call your ship a "smart ship," then you know that you and those about your are "smart sailors" and can be depended upon anywhere and at any time. A "smart ship" is always a happy ship. It shows that everyone on board is considerate of everyone else, that everyone tries to help and co-operate with each other, and that everyone knows his job and is doing it.

About once every 3 years the Board of Inspection and Survey inspects each ship to determine its material condition. This board inspects all

parts of the ship, all machinery, ordnance material, and general equipment to determine its readiness for service.

MESSES

The supply officer of the ship has charge of the general mess. He is assisted by commissary stewards, cooks, bakers, butchers, and jacks-of-the-dust as are necessary for the purchase, stowing, issuing, and preparation of food for all hands. The ship's crew is divided into messes of about 20 men each, each mess being made up of men from the same division as far as practicable and placed in that division's part of the ship. A petty officer is in charge of each mess, and all complaints by members of the mess must be made to this petty officer in charge. The petty officer of the mess should then investigate the complaint and, if necessary, bring the complaint to the attention of the officer of the deck. The petty officer, is responsible that proper order is kept, that food is not wantonly wasted, and that sufficient food is provided. A mess cook is detailed to each mess who is responsible for the cleanliness of the mess table and mess gear, serves food to the mess, and assists in drawing provisions and preparing the food for cooking. Messmen are excused from all work in their division part of the ship and from all watches, but they must attend all quarters and drills unless properly excused by the executive officer. Special police petty officers are placed in charge of all messmen and they are responsible that the messmen carry out their duties, keep their station and mess clean, and keep their persons clean. They inspect the messmen every day and inspect the mess tables and mess gear before every meal.

WATCHES AND DIVISIONS

The ship's company is divided into 2 watches, starboard and port, half of each division being in each watch. Each watch is divided into 2 sections, so that each division is made up of 4 sections numbered from 1 to 4, the odd-numbered sections being in the starboard watch and the even-numbered in the port watch.

Each ship has the following departments: gunnery, navigation, engineer, construction and repair, supply, medical. Each department is divided into divisions, based primarily upon crews assigned to battle stations, as follows:

Gunnery.—All gun, torpedo, and fire-control divisions, including the marines. Each gun division includes, as far as possible, only one class of gun.

Navigation division for ship control, and all communications control.

Engineer.—Main engine, boiler, auxiliary, and electrical divisions for ship propulsion.

Construction and Repair division for handling casualties to the ship.

Supply.—Cooks, bakers, etc., stationed where they will be of greatest service.

Medical division for treatment of personnel casualties.

Aviation personnel attached to carriers, tenders, or other auxiliary vessels constitute an air department. On all other vessels, aviation personnel is in the gunnery department.

The number of divisions on board ship varies with the size of the ship and with the number and caliber of the guns. In small ships one officer may be head of more than one department.

The executive officer co-ordinates the work of the various heads of the departments and carries out the policies of the captain.

SCRUBBING AND CLEANING

Clothes to be scrubbed should be soaked overnight if practicable in soapy fresh water. Before soaking clothes, however, be sure that the morning orders allow scrubbing clothes in the morning watch; otherwise there will be no clothesline to dry them, and it is not permissible to keep wet clothes about the decks. Clothes should be scrubbed by hand, with special care taken to get the tapes and seams clean. If clothes are very dirty, it may be necessary to lay them flat on deck and scrub them thoroughly with a brush. The brush is very hard on the clothes and should only be used on new, stiff clothes or on very dirty clothes. After scrubbing, rinse the clothes with salt water, being especially careful to get all the soap out, as soap will ruin your clothes.

Hammocks and bags are laid out flat on deck and scrubbed thoroughly on both sides, using a heavy brush, and then rinsing carefully. Care must be taken to get these clean, as each is inspected before turning in, and those dirty will have to be rescrubbed.

Blankets and mattress covers are scrubbed like hammocks and bags. Mattress covers should be changed every "aired bedding" and at least once every week. Blankets should be scrubbed at least once every month.

Paint work.—In cleaning paint work, sand and canvas take off the paint as well as the dirt unless great care is taken. Fresh water and very little soap will often save much labor. Lye "eats off" paint and should not be used. Rust spots can be removed by canvas and fresh water if care is exercised. Greasy dirt is the hardest thing to remove. For that

reason care must be taken by every member of the crew to keep the paint work clean. Cleaning paint work does not mean the cleaning of only certain exposed places; as far as possible every nook and corner should be cleaned every morning.

Linoleum.—Never let water stand on a linoleum deck, as it will soak into the cracks and soon loosen if from the deck, besides causing serious corrosion to the deck.

Fire hose and canvas are scrubbed with soap and water and thoroughly rinsed with salt water. Never use sand on fire hose or scrub hose on a sandy deck, as this wears it out very quickly. Hose and canvas must be triced up and dried thoroughly before being stowed away. If stowed away damp, they will soon mildew and spoil.

Bright woodwork and oars are scrubbed with sand and canvas.

Note.—After washing down decks, all paint work that has become wet from so doing must be wiped dry. If this is not done, the drops of salt water will evaporate and leave the paint work speckled with white salt marks which are very untidy and hard on the paint. All depressions in the deck, waterways, etc., must be thoroughly dried with swabs.

Compartment cleaners are detailed by their division officers and are responsible for the cleanliness and tidiness of the compartments assigned to them. They are also responsible for the proper placing and care of the equipment of the compartments. They are excused from cleaning any other part of the ship, but must attend all quarters and drills.

Note.—The section leaders on the upper decks are responsible to the division officers for the equipment in their part of the ship.

SMOKING HOURS

The commanding officer designates the parts of the ship where smoking is allowed, and, if possible, places are provided where all may be comfortable.

The crew is usually permitted to smoke from *All hands* to *Turn to,* during meal hours, and from the time the hammocks are down until tattoo.

The crew may also be permitted to smoke at other times, especially on holidays or Saturday and Sunday afternoons, and for a limited period during night watches.

Smoking in any part of the ship during divine services is forbidden.

Smoking in the ship's boats not on detached service is forbidden.

After the hammocks are down the crew can smoke only on the upper decks.

The police petty officers have charge of the smoking lamp and see that it is kept lighted only during the approved hours. They take care that there is no smoking in any unauthorized places or at unauthorized times.

While fuel oil is being taken aboard, no open light, smoking, or electrical apparatus liable to spark shall be permitted within 50 feet of an oil hose, tank, compartment containing a tank, or the vent from a tank. No smoking shall be permitted at any time in the compartment containing a fuel oil tank, fuel oil pumps, or pipe, except that it may be permitted on the fireroom floor in front of the furnaces.

There shall be no smoking when ammunition is being received or discharged.

LUCKY BAG

The *lucky bag* is a place where the police petty officers stow for safe-keeping effects that are found adrift about the ship. All clothes, etc., found about the decks are placed in the lucky bag. When clothes are piped down, the police petty officer attends and takes care of all clothes not called for and places these in the lucky bag. All effects in this bag belong to the persons who lost them. At frequent intervals the lucky bag is opened and the effects distributed to the owners. Where persons have been guilty of carelessness in leaving their effects adrift, they are placed on the report.

SHIP'S ORDERS

Each ship has a *ship's organization bill* which contains detailed instructions as to organization and stations of all men in every emergency drill. In addition to this, the captain through his executive issues ship's orders from time to time, as occasion arises, to cover points not covered by the ship's organization. These ship's orders have the same authority as other regulations. The division officers keep a complete file of them and publish them to their divisions when issued.

MISCELLANEOUS INFORMATION

Galley fires and lights.—All fires used for cooking are extinguished at tattoo unless they are specially authorized by the captain to be continued longer for some specific purpose. When the weather is very warm, they are extinguished as early as possible, if by so doing the comfort of the crew is increased.

All lights except those in the cabins, offices, officers' quarters, and those designated as standing lights are extinguished at tattoo.

The lights on the lower decks are reduced in number before tattoo unless they are required for the comfort of the crew. All lights in the holds, storerooms, and orlops, and all open lights in the ship, except those in officers' quarters, are extinguished before 1930 or at the time of the evening inspection by the executive officer.

During the night a sufficient number of standing lights throughout the open part of the ship are kept on to enable the officers and crew to turn out, repair to the upper decks, or to attend to any duty arising from a sudden emergency. These are known as standing lights.

During rainy or cloudy weather, and at other times when the duties of the ship will permit, sufficient lights are supplied between decks for the crew to read, write, or engage in recreation.

Such lights and fires as the captain may deem dangerous are extinguished when the magazines are opened or when handling or passing powder, explosives, or other dangerous combustibles.

In time of war or when necessary to conceal a ship from an enemy, only such lights are used as are deemed advisable by the senior officer present.

Matches.—None other than safety matches are permitted on board, and the captain prescribes the necessary precautions to be observed in their use. They shall not be used in storerooms, holds, or orlops, and care shall be taken that persons about to enter the magazines and shell rooms have no matches about them.

Disposal of refuse.—Wood, barrels, packing boxes, or unpierced metal cans shall not be thrown overboard, either in port or at sea. All such boxes and barrels must be broken up and sent to the fireroom or incinerator; all metal cans must be pierced before being thrown overboard. In confined ports where garbage would constitute a menace to the health or a nuisance to the people in the vicinity, it shall not be thrown overboard but shall be burned on board ship or otherwise disposed of in some suitable manner prescribed by proper authority.

Card playing and gambling.—Card playing is usually forbidden below the berth deck or the third deck at any time. Card playing, checkers, and similar games are usually permitted on the main deck during the dinner hour and after working hours. Gambling is forbidden in any form at any time or place. Onlookers at gambling are liable to be punished as well as players.

Visitors are never allowed in the turrets or below the gun deck unless

accompanied by an officer. They are allowed on board ship only with the permission of the officer of the deck at certain stated times established by the executive officer.

Pets may be brought on board only by express permission from the executive officer.

Profanity or the use of filthy language is a sign of ignorance in the man using it and shows a serious lack of principles required of a leader of men. Habitual use of profanity will prevent advancement in rating and will cause the user to be placed on report. It is the duty of all men to stop this filthy practice in others.

Air and gun ports.—When at sea no ports shall be opened without the knowledge and consent of the captain, and they shall always be opened and closed by men especially appointed for that duty. Ports of the lower decks shall be closed at sunset unless special authority is granted to keep them open, and a report shall always be made to the officer of the deck when a port is opened or closed. Neither gun ports nor air ports shall be opened when there is any probability that water will enter to a dangerous extent. Nothing is to be hung over or placed in or thrown out of gun ports.

Quarter-deck, officers' quarters, and bridge.—Men are allowed on the quarter-deck only when they are there on duty. No men are allowed in officers' quarters except on duty. Bridges are for men on duty only.

CHAPTER 26

I—AIM AND OBJECT OF ALL GENERAL DRILLS

General 215
Water-tight integrity 216
Details of drills 217
Fire drill 217
Collision drill 220
Abandon ship drill 221
Fire and rescue drill 223
Plane crash and salvage 225
Battle drill 227
Battle bill 229
General quarters 232
Fueling ship 234

GENERAL

A GENERAL drill is one in which all hands participate. Every person on board has a station for each general drill which may be a very active part, or it may be merely standing at quarters waiting to be assigned as a relief.

General drills include *General Quarters* and all emergency drills. The latter include *Collision Drill, Fire Drill, Abandon Ship Drill, Fire and Rescue Drill, Plane Crash and Salvage*. No one is excused from any of these drills unless permission has been previously obtained from the executive officer by the head of department of the man concerned. Unless a man is doing work of an emergency type, he has absolutely no reason to request to be excused.

The highly mechanical features of the modern ship make it a very extreme necessity for the ship's company to be well organized and efficient in all its drills by knowing where to go, what to do, from whom to take orders, and how to co-operate with the various other units aboard ship.

General drills develop teamwork in the ship's company so that every department, every division, every section, and every man knows and does what is required in every emergency. Lack of this teamwork would create a mob action wherein nothing would be done.

Each man stationed, although it may seem unimportant to him, is a cog in a big ship's machine. A weak cog here and there is liable to

cause the machine to break down, and will result in an unsatisfactory drill.

Each individual must at all emergency drills do the duty assigned to his station thoroughly and efficiently, and help to develop that unity of action and teamwork with his shipmates that is so necessary for success.

For all general drills, the general alarm gongs are sounded throughout the ship, after which the bugle call for that drill is sounded.

The general alarm is to attract attention, the bugle call to designate the emergency on all occasions of general drills.

Silence is the first requisite of discipline on the well-drilled ship. Unnecessary noise of any kind makes confusion. Those in authority, and this includes the petty officers, are the only ones whose voices should be heard. Every man should go to his station at once on the *double.* If it so happens that a man is assigned no specific duties, he shall fall in at his quarters and keep silence.

In each division, stations and duties are assigned on the basis of the watch bill, by squad or sections. In order that all tasks be done even in the absence of some of the men, the ship's organization provides for all conditions, such as lying in port with one-half or more of the officers and men away from the ship, or with the ship in dry dock. This assures complete performance at any time.

"Central" should always be informed by telephone of the location and character of an emergency.

During emergency drills at night, those men whose hammocks are billeted in gangways take one turn of the lashing around the hammock and swing it clear of the passageway.

After an emergency drill or general quarters, *Secure* is sounded on the bugle. When all divisions have fallen in at quarters and reported secure, *Retreat* will be sounded on the bugle.

In light craft such as destroyers, which are equipped with a general alarm system, but whose complement does not include a bugler, the call is passed by word of mouth. Reports are made over the voice tubes or by messenger to the bridge, which is the central station of these light craft.

WATER-TIGHT INTEGRITY

There is no more important safeguard to a ship than to keep it water-tight. The ship may be injured by collision, grounding, explosion, or gunfire, but if the decks and bulkheads which divide the ship into many compartments are tight, the flooding can be confined to the in-

jured spaces and the ship kept afloat. If doors and hatches are left open, it may be impossible to close them after the casualty, as they may be buckled by the collision or explosion or distorted by the water pressure. Therefore, at all times all doors and hatches not needed should be closed. At night, at sea, and particularly at sea in a fog, all lower decks should be made water-tight. During the day at anchor when men are available and casualties are less liable to occur, and when work is going on about the ship, it is not convenient to keep everything closed. The rule should be, however, to close up and inspect all storerooms and compartments when not in actual use.

The doors, hatches, and manholes giving access to all compartments must, when closed, be securely dogged to insure water-tightness. Double-bottom manhole covers should be kept securely dogged at all times except as necessary for access for inspection, cleaning, and painting, and they should never be left open overnight or when men are not actually engaged in work.

The ship's organization provides for closing those water-tight doors, hatches, and ventilator openings which are designed to be closed during maneuvers, in fog, or as a matter of routine at night.

The call for closing all water-tight doors is the bugle call, *Water-tight doors,* and the sounding of the warning howlers.

DETAILS OF DRILLS

All men must have a general knowledge of the duties performed by each department on his ship at each drill. In particular, every man must know the calls and must know in detail his own duties and those of his division for each drill.

FIRE DRILL

The calls.—(1) *Emergency signals.*—(*a*) General alarm.

(*b*) Ship's bell rung rapidly, followed by designating number of strokes to indicate location.

(*c*) *Fire quarters* on the bugle, followed by the same number of blasts to indicate position.

(*d*) Word passed by the boatswain's mate as to location.

(2) *Secure signals.*—(*a*) *Secure* on the bugle.

(*b*) *Secure* by the boatswain's mate.

(*c*) *Secure* over the interior-communication system.

Any person discovering fire on board ship will endeavor to extinguish it or prevent the spread of flames. Use will be made of fire extinguishers

and other special appliances immediately available. Word shall be sent at once to the officer of the deck.

Officers' stations and duties.—(1) *Executive* at scene of fire in charge.

(2) *Gunnery officer* shall have men stationed at flood cocks and sprinkler valves; be prepared to flood threatened magazines or shell rooms; have dry primers and detonators removed from vicinity of fire.

(3) *Navigation officer* shall relieve the deck.

(4) *Engineer officer* (engine-room) shall have an officer stationed at the steam fire-extinguishing manifold, and at the chemical extinguishing valve if the fire is in a compartment so piped.

(5) *First lieutenant* shall aid the executive.

(6) *Medical officer* at the sick bay shall make preliminary provision for removal of sick, and shall be prepared to receive injured and to dispatch a first-aid party.

(7) *Supply officer* shall assure himself that storeroom keys are supplied, and make preliminary plans for saving public money and records.

Special details.—The following special details shall assemble well clear, but near the scene, of the fire, under the command of the carpenter:

(1) Repair crew with tools.

(2) Fire extinguisher details.

(3) Rescue breathing apparatus details.

General duties.—(1) Connect up and lead out hose to all fire plugs in vicinity of fire. Divisions that are remote from the fire will use their hose to extend other lines.

(2) Put pumps on fire main.

(3) Serve out flood cock, magazine, and storeroom keys.

(4) Flood magazines and shell rooms, if necessary.

(5) Remove explosives, gasoline, oils, and other inflammable material from vicinity of fire.

(6) Close air ports, doors, and hatches where necessary. Care should be taken not to cut off or close unnecessarily the passages and hatches used for access and for communication.

(7) Men having charge of storerooms will stand by them with keys.

(8) Stop blowers or close valves in air ducts where they supply air to the fire.

(9) Be prepared to light up vicinity of fire with portables, lanterns or electric bull's-eyes.

(10) If alongside a dock or other vessel, prepare to cast off.

(11) If at anchor, prepare to weigh or slip.

(12) Remove sick and prisoners to place of safety.

Fire extinguishers.—There are three classes of fire extinguishers used in the forces afloat, as follows:

(1) *Carbon dioxide* (CO_2).—(*a*) 15-pound capacity, portable, hand; used in power boats and on board ship.

(*b*) 35-pound capacity, built in; used in certain power boats.

(*c*) 50-pound capacity, built in; used in certain boats.

(*d*) Battery of one or more 50-pound cylinders, built in; used on board certain vessels for gasoline, fuel oil, and paint stowage protection.

This type extinguisher is extremely useful in fighting electrical, gasoline, and fuel-oil fires. It acts by smothering the fire with carbon dioxide gas, and the built-in systems may be operated at a distance from the fire.

(2) *Foam.*—(*a*) 2½-gallon, portable, hand; used in power boats and on board ship.

(*b*) 40-gallon, built in; used in firerooms on board ship.

(*c*) Continuous foam generators connected to a fire main on board ship.

This type of extinguisher is extremely useful in fighting fuel-oil fires in such places as firerooms.

(3) *Carbon tetrachloride.*—1-quart, portable, hand; used in power boats and on board ship.

This type of extinguisher is extremely handy and is fitted with a hand pump. It may be used effectively against electrical apparatus, since it will not damage electric insulation or fabrics. Special care should be exercised relative to the use of carbon tetrachloride fire extinguishers in confined spaces because the fumes have a suffocating effect.

Note.—The portable, hand, 2½-gallon foam and the 1-quart carbon tetrachloride extinguishers are being replaced by 15-pound carbon dioxide (CO_2) extinguishers as the former become unserviceable and stocks on hand are exhausted.

Fire at general quarters.—Should there be a fire in action, it will be fought by repair parties designated by the damage control officer and men at the scene of the fire. As far as practicable, the fire of engaged guns must not be interrupted. Effort must be directed to prevent the spread of the flames, to remove spare ammunition to a safe distance, to divert chains of ammunition passers passing too close to the fire, and to isolate endangered magazines, flooding them if necessary.

Rescue breathing apparatus.—The saving of life may depend on the ability to send men into compartments filled with irrespirable gas. The possibility also exists that the safety of the vessel may likewise so depend. For this contingency rescue breathing apparatus is supplied to vessels. Intelligent men should be able to find their way into any compartment to locate the flood cocks and to work despite the presence of noxious gases. These details should be composed of members of the repair party who would always be available in action. See Chapter 59 for instruction in this apparatus.

COLLISION

The calls.—(1) *Emergency signals.*—(*a*) General alarm.
(*b*) One long blast of the siren.
(*c*) The warning howlers.
(*d*) Word passed by boatswain's mate as to location of injury.
(*e*) *Assembly* on the bugle.
(2) *Secure signals.*—(*a*) Three blasts on the siren.
(*b*) *Secure* on the bugle.
(*c*) *Secure* by boatswain's mate.
(*d*) *Secure* over the interior-communication system.

Officers' stations and duties.—(1) *Executive* in general charge.

(2) *Gunnery officer* shall take charge of placing of collision mat.

(3) *Navigating officer* shall inform himself of the course and distance to the nearest shore; be prepared to serve out charts, navigating outfits, and to relieve the deck.

(4) *Engineer officer* shall see that the pumps are put on flooded compartments or on drainage system; and shall keep the executive informed as to the condition of all compartments in his department.

(5) *First lieutenant and damage control officer* exercises supervision over the divers. He assures himself that the arrangements outside the engineers' department permit pumping of damaged compartments.

(6) *Assistant to the damage control officer* takes station in central station, receives reports from the various divisions, and makes reports to executive officer over the general announcing system.

(7) *Medical officer,* at the sick bay, shall make preliminary provision for removal of sick; and shall be prepared to receive injured and to dispatch a first-aid party.

(8) *Supply officer* shall be prepared to supply storeroom keys, and shall make preliminary provision for saving public money and records.

Collision at Anchor

The officer of the deck shall be prepared to veer, to rig in the booms, and to clear the side as far as practicable.

General duties.—(1) Close water-tight doors and fall in at quarters.

(2) Prepare the collision mat; get it over if ordered.

(3) Pump out all flooded compartments.

(4) Localize the flooding as much as possible by closing valves and shoring bulkheads.

(5) Rig and man diving outfit, and prepare to get diver over the side.

(6) Man lifeboats; prepare to lower all other boats; be prepared to rescue or render assistance.

(7) Release prisoners.

(8) Prepare to remove sick.

(9) If at anchor, prepare to get under way.

(10) At night man searchlights.

(11) Prepare leak stoppers for use.

(12) Be ready to take measures to keep ship on even keel, such as shifting oil, stores, or flooding compartments if necessary.

Detailed duties.—Doors, hatches, and valves are grouped, and groups assigned to squads. At drill it is important to require every dog to be secured, and defects which prevent the efficient closing of doors, hatches, or valves to be reported to the division officer at once. These defects shall be immediately remedied.

Escapes.—The collision bill indicates the escapes to the upper deck. Care shall be exercised that no man is sealed in a compartment.

Collision or Under-water Damage at General Quarters

No emergency signal is made. The senior present in the endangered locality will localize the damage, using men available and the repair crew. He will report the damage as soon as it occurs to central station over the interior-communication system, if possible, or if that is carried away, by messenger.

ABANDON SHIP DRILL

General requirements.—The bill shall provide for: (1) Having all hands provide and put on life jackets.

(2) Getting boats and rafts out and embarking as quickly as possible, providing a life jacket for each man and sea ladders or lines at points designated for embarking.

(3) Getting out, manning, provisioning, and equipping boats and rafts.

(4) The organization should provide for: (*a*) Making two or more trips with the boats.

(*b*) Varying the capacity of each type of boat below maximum allowed, regulated by sea conditions.

(*c*) Reduced number of boats available due to accident or other conditions.

(*d*) Periodical inspection of life belts.

The calls.—(1) *Emergency signals for "Abandon ship."*—(*a*) General alarm.

(*b*) *Abandon ship* on the bugle, followed by *Double time* on the bugle.

(*c*) The boatswain's pipe *All hands abandon ship.*

(2) *Emergency signals for "Provide for and abandon ship."*—(*a*) General alarm.

(*b*) *Provisions* on the bugle, followed by *Abandon ship* on the bugle.

(*c*) The boatswain's pipe *All hands provide and equip for abandon ship.*

(3) *Secure signals.*—(*a*) *Secure* on the bugle.

(*b*) *Secure* by boatswain's mate.

(*c*) *Secure* over interior-communication system.

Station and duties.—(1) *Executive* in general charge.

(2) *Gunnery officer* and *first lieutenant* shall take immediate charge of embarkation, one on each side of the ship.

(3) *Navigating officer* shall relieve the deck, prepare to give the course and distance to land.

(4) *Engineer officer* and his assistants repair to their stations in engine-rooms and firerooms. All petty officers of the engineer department take steaming stations; relieve as many nonrated men as possible.

(5) *First lieutenant.*—See (2) immediately above.

(6) *Medical officer* shall supervise the transportation of the sick and injured to the first crews.

(7) *Supply officer* shall save the public money and accounts.

(8) The ship's company shall be detailed into first crews and second crews.

(9) Of the officers, generally, the juniors should be detailed to the first crews; the seniors should be detailed to the second crews. Of the men, the junior ratings should generally be detailed to the first crews.

Each crew should have sufficient experienced men of the seaman branch to insure proper handling of the boat.

(10) Provide each man and officer with a life jacket.

(11) Second crews shall assemble clear of the boats on the bridges and the superstructures.

(12) First crews shall assemble adjacent to boats.

(13) The deck petty officers of the second crews shall assist in getting out the boats for the first crews.

(14) The prisoners shall be released.

(15) At the proper time notification shall be sent to personnel below, who then secure boilers and machinery and join the second crews.

(16) Reasonable provision shall be made to save the logs, records, and muster rolls. Confidential books and papers must be saved or destroyed.

Boat capacities and allowances.—The capacity of the boats as shown by their label plates shall be used in assigning men for abandon ship.

The amount of water carried in breakers for abandon ship is based upon the number of men that can be carried at one time in the ship's boats. The allowance per man on this basis is ½ gallon on battleships and large cruisers, and 1½ gallons on all other vessels.

Additional for provisioning and equipping.—(1) Officers provide binoculars.

(2) The assistant navigator takes chart and navigation gear.

(3) The signal officer takes rockets, Very's pistol, and signal stars.

(4) The first crew shall be provided with equipment, including medical boat box, and, in addition, four buckets for bailing.

Return of boats.—The boats will be brought back by details from the first crews to take off the second crews and make other trips.

FIRE AND RESCUE

Employment.—The fire and rescue party may be called to assist a vessel on fire, to prevent the spread of flames to shipping, to render assistance on shore, or to rescue people from a vessel in distress. As the particular emergency cannot be foretold, the entire equipment specified should always be provided. Boats should be commanded by boat officers.

The calls.—(1) *Emergency signals.*—(*a*) General alarm.

(*b*) *Assembly* on the bugle.

(*c*) The boatswain's pipe *Away fire and rescue party.*

(2) *Secure signals.*—(*a*) *Secure* on the bugle.

(*b*) *Secure* by boatswain's mate.
(*c*) *Secure* over interior-communication system.

Organization.—(1) The rescue detail.
(2) The fire detail.
(3) The relief detail.

(1) The Rescue Detail

Boats and organization.—To be taken from the division or divisions that man the specified boats, each of those divisions to have a complete organization in each watch, a medical officer, with outfit, to stand by to go with this detail. In addition to the regular equipment each boat will take:

(1) One life jacket for each officer and man in the boat.
(2) One ring life buoy fitted with hauling line.
(3) One hand grapnel on a line.

In port, power boats should be used if immediately available.

(2) The Fire Detail

Boats and organization.—The boats designated should be those which are quickly hoisted out, are adequate, and have motive power. Each watch of the divisions from which the fire details are drawn should contain a complete fire detail, so that with men on liberty the organization can handle the emergency. The necessary artificers should be similarly detailed.

Equipment.—Each boat should carry its regular equipment excepting spars. The special equipment should be provided by an adjacent division, leaving the fire details free to man their boats.

(1) The first boat to go out should carry:
- (*a*) Boat officer and crew.
- (*b*) Artificer with unshackling kit.
- (*c*) Rescue breathing apparatus detail.
- (*d*) 1 life jacket for each officer and man in the boat.
- (*e*) 1 ring life buoy fitted with hauling line.
- (*f*) 2 hand lanterns.
- (*g*) 2 foam-type extinguishers.
- (*h*) 6 buckets.
- (*i*) Fire-party chest, containing:
  - (1) 2 axes.
  - (2) 1 crowbar.
  - (3) 2 grapnels fitted with chain and rope lanyards.

(4) 2 heaving lines.
(5) 6 bucket lanyards.
(6) 2 cold chisels.
(7) 2 ball-peen hammers.
(8) 1 maul.
(9) 1 Stillson wrench.

(2) The second boat to go should carry:
(*a*) Boat officer and crew.
(*b*) Carpenter or mate
(*c*) Handy-billy pump crew.
(*d*) 1 life jacket for each officer and man in the boat.
(*e*) 1 ring life buoy fitted with hauling line.
(*f*) 2 hand lanterns.
(*g*) 1 handy-billy pump.
(*h*) 2 lengths of suction hose with strainer.
(*i*) 3 lengths of fire hose.
(*j*) 1 nozzle.
(*k*) 1 spanner.
(*l*) 1 reducer.
(*m*) 1 jigger and 2 straps.
(*n*) 1 line, 5-inch.

(3) The Relief Detail

Employment.—(1) To relieve or augment the fire and rescue details.

(2) To be armed for shore duty to assist the local authorities in preserving order and protect property.

(3) To respond to the local fire regulations at a navy yard.

(4) To man additional boats for rescue duty.

Organization.—It should be organized for each watch from a division or divisions not furnishing the rescue or fire details.

PLANE CRASH AND SALVAGE

When planes are being launched or picked up, a ready boat shall be manned and ready for use. The motor lifeboats will normally be used.

Ready and salvage boat personnel.—Boat officer, medical officer or pharmacist's mate, signalman, diver and tender, if shallow water diving apparatus is available, regular boat's crew.

Boat personnel shall be selected from men who are good swimmers. They shall be thoroughly instructed in regard to the general construction of the different types of aircraft, the manner in which a plane in

the water should be approached, and how to attach towing lines, grapnels, or other gear to tow a plane.

Boat equipment.—

2 bolt cutters, 18″ and 24″
1 crosscut saw, 26″
2 hack saws
1 doz. fine hack-saw blades
1 doz. coarse hack-saw blades
1 axe 30″
1 hatchet
1 gas pliers, large
2 screw drivers, 12″ and 6″
1 side cutter, 8″
1 end cutter, 10″
1 Westcott wrench, 8″
1 Stillson wrench, 18″
2 monkey wrenches, 12″ and 8″
1 ball-peen hammer, 16 oz.
2 cold chisels, 6″
1 pinch bar, 24″
1 drift pin, 14″
1 copper maul
1 marlinespike
1 hand Pyrene
1 hand grapnel and line
1 large knife
1 wire strap, ½″ by 8′
1 first-aid kit
2 flashlights
Regular boat equipment
First-aid medical kit
life rings with lanyards
Marker buoys with anchor and line
Two grapnels
Shallow-water diving apparatus, if available
50 fathoms of 3″ Manila line.

The ready boat should be completely equipped and ready for lowering. Boat's crew and ready parties shall stand by their boat on deck. Necessary steps shall be taken at intervals to insure the operation of engines.

Training.—All officers and men who may at any time be concerned with salvaging planes from the ready boat, with tending their towing, or with hoisting them aboard ship shall be thoroughly instructed concerning their possible duties. Bureau of Navigation courses in "Aviation Seamanship" and other available material should be utilized for this purpose.

Classification of accidents.—(1) *Forced landing.*—Plane and personnel undamaged. This is the simplest form of accident which requires assistance from the ready boat. However, all possible speed must be used in rendering this assistance as a landplane will not remain above the surface of the water after landing more than 3 or 4 minutes if its flotation equipment fails to function. On arrival alongside a plane under these circumstances, the first concern is the safety of the personnel of the plane, the second is the salvaging of the plane. This latter requires the attaching of one end of a line to the plane and the passing of the other

end to the ship which should be close aboard by the time this stage of the salvage operation is reached.

(2) *Plane damaged and sinking.*—Personnel submerged. In this case the salvage boats on arrival at the scene of the accident should make every effort to rescue personnel first but while doing so a line should be attached to the plane, by grapnels or otherwise, as quickly as possible so that the sinking of the plane will be retarded, thus giving more time to disengage any personnel that may be entangled in the wreckage or held in the plane. In case it is necessary for any member of the rescue boat's crew to go overboard in an effort to extricate personnel from a wrecked plane, he should always have a line attached to his body and be properly tended by a man in the boat. Men going overboard under these circumstances must be cautioned regarding the possibility of becoming entangled in the wreck should it suddenly sink.

BATTLE DRILL

Preparedness.—It is the duty of the ship to take the initiative in maintaining a full allowance of fuel, ammunition, stores, and spare parts. It may become impossible to overcome defects and supply deficiencies when hostilities are impending. A ship on leaving port should at all times be prepared for action on short notice. Guns should be kept bore-sighted. The stripping and clearing of the ship should mean only the accomplishment of details contributing to the offensive use of the armament and to the protection of personnel and material.

Thoroughness.—Clear ship is to be considered as an evolution in which thoroughness is the first consideration.

Two stages of clear ship.—Ships shall be cleared for battle, as far as material is concerned, in two stages under the following designations:

(1) Strip ship;

(2) Clear ship for action.

(1) Strip Ship

When done.—This shall be done when war is impending.

Material to be landed.—For drill and inspection the following material shall be tagged "Store." Boats may be anchored off.

(1) Boats, except those designated by the commander in chief.

(2) Generally everything inflammable or liable to cause splinters that can be dispensed with.

(3) Stanchions and davits not needed. Facilities for spreading certain awnings should be retained.

(4) Unnecessary canopy frames.

(5) Unnecessary clothing for officers and men.

(6) Substitute wind sails for ventilators where possible. Protective preparations (need not be done for drill and inspection).

(7) Rig wire splinter nets under engine-room and fireroom gratings.

(8) Rig splinter screens and mantlets.

(2) Clear Ship for Action

The call.—The boatswain's pipe *All hands clear ship for action.*

General duties.—*For drill and inspection the following details need not be completed,* but the ship's bill shall show in detail what should be done:

(1) Prepare for full power.

(2) Stow in torpedo rooms detonators and dry primers for use in torpedoes. Others shall be stowed in safe compartments well below the water line.

(3) Prepare to load torpedoes.

(4) Release prisoners.

(5) Throw overboard unnecessary inflammable oils, paints, and liquids.

For drill and inspection the following shall be done:

(6) Prepare the battery for action.

(7) Prepare dynamos, air compressors, and fire and bilge pumps for service, and start those necessary.

(8) Test out all fire-control and ship-control communications and instruments.

(9) Connect up and test out fire hose (secure hose so as to be clear of blast of guns).

(10) Rig all necessary blast screens; secure searchlight against blast.

(11) Throw in battle circuits; throw out all circuits not required for action.

(12) Prepare auxiliary lighting arrangements.

(13) Rig battle signal stations (radio and flag).

(14) Rig repair station; prepare collision mat.

(15) Rig dressing station and issue first-aid packages.

(16) Supply drinking water.

(17) Prepare auxiliary steering and ship-handling stations.

(18) Shut steam not needed off all unprotected leads. Prepare to operate boiler stop and safety valves from outside boiler compartments.

(19) Wet down weather decks and plug scuppers. Put water in boats and lash canvas over them.

(20) Provide grapnels for clearing the screws.

(21) Secure anchors, unbend chains, and pay below (while on soundings keep one chain bent).

(22) Stow life preservers in convenient but protected places.

(23) Close the water-tight doors and hatches designated to be sealed during action; close battle ports; at night screen lights (attention is invited to the necessity for not interrupting the means of access or of communication to the various parts of the ship).

(24) Unship and secure the ventilators and ladders that interfere with the battery.

(25) Stowage shall be assigned to the following, which will leave free passage for the ship's company and will provide protection from gunfire:

(*a*) Navigational instruments.
(*b*) Fueling gear.
(*c*) Mess and galley gear.
(*d*) Bags, hammocks, ditty boxes, and cots.
(*e*) Gunnery training gear.
(*f*) Diving gear.
(*g*) Field guns.
(*h*) Wash-deck gear.
(*i*) All other loose gear.

(26) Before battle, men shall bathe and shift into clean underclothes.

(27) Supply ammunition.

(28) Have small arms and ammunition ready for serving out.

(29) Masthead the battle ensigns and make all final preparations for battle.

(30) Supply gas masks.

(31) Arrange for providing food and water.

BATTLE BILL

Battle stations; reliefs.—(1) *Captain,* conning tower; relief, executive.

(2) *Executive,* secondary control station in direct communication with the captain.

(3) *Gunnery officer,* chief fire-control station (sub-section 1); relief, assistant fire-control officer.

(4) *Navigating officer,* primary ship control station (sub-section II) ; relief, designated by the captain.

(5) *Engineer officer,* engine-rooms (sub-section III) ; relief, next in rank in the Engineering Department.

(6) *First lieutenant and damage control officer,* central station (sub-section IV) ; relief, assistant damage control officer.

(7) *Medical officer,* primary dressing station (sub-section V) ; relief, next in rank in the Medical Department.

(8) *Communication officer,* conning tower (sub-section VI) ; relief, next in rank in the communication division.

(9) *Supply officer,* station and relief to be designated by the captain.

(10) *Chaplain,* station where he may attend the wounded, to be designated by the captain.

I. Fire Control

(1) *Chief fire control officer.*—Gunnery officer, fire control tower.

(2) *Assistants.*—(*a*) Main battery.

(1) Spotters (I, II, III, IV, or V).
(2) Plotting-room officers.
(3) Turret officers.

(*b*) Secondary battery.

(1) Assistant fire control officer, station, secondary battery control forward.
(2) Group control officers.
(3) Battery officers.

(*c*) Anti-aircraft battery.

(1) A.A. control officer, station, sky control.
(2) Group control officers.
(3) Battery officers.

(*d*) Torpedo battery.

(1) Torpedo officer, station, torpedo director.

(*e*) Ordnance repair crew.

(1) Gunner, station as designated.

(*f*) Aircraft division.

(1) Senior aviator.

(3) *Items to be covered in Battle Bill.*—(*a*) Stations to be manned and personnel thereat for each condition of readiness, and procedure for passing from one condition to another.

(*b*) Succession of reliefs for personnel at each station.

(*c*) For each condition of readiness, and for various conditions

of action, the functions of all batteries and each station, including:

(1) Succession of control stations and succession of methods of control for:
  1) Single target.
  2) Multiple targets on same sides.
  3) Multiple targets on opposite sides.
(2) Illumination procedure and control.
(3) Ammunition supply.
(4) Launching and employment of aircraft.
(5) Procedure for casualties.

II. Ship Control

(1) *Navigator,* station, primary ship control station.

(2) *Items to be covered in Battle Bill.*—(*a*) Ship control stations and personnel thereat for each condition of readiness, and procedure for passing from one condition to another.

(*b*) Succession of reliefs for personnel at each station.

(*c*) Successive steering stations, methods of steering.

(*d*) Battle lookouts, aircraft lookouts.

(*e*) Aloft conning stations, required not only to avoid torpedoes and mines, but also whenever any below-deck steering station has control.

(*f*) Casualties and procedure.

III. Motive Machinery and Auxiliaries

(1) *Engineer officer,* station, control engine-room.

(2) *Items to be covered in Battle Bill.*—(a) List of stations and personnel thereat for each condition of readiness, and procedure for passing from one condition to another.

(*b*) Succession of reliefs for personnel at each station.

(*c*) Casualties and procedure.

(*d*) General damage control instructions for Engineer Department.

IV. Damage Control

(1) *First lieutenant,* station, central station.

(2) *Items to be covered in Battle Bill.*—(*a*) List of stations and personnel thereat for each condition of readiness and each material condition, and procedure for passing from one condition to another.

(*b*) Succession of reliefs for personnel at each station.

(*c*) General damage control instructions.

Aid to wounded.—(1) *Medical officer,* station, primary dressing station.

(2) *Items to be covered in Battle Bill.*—(*a*) Primary and secondary dressing stations.

(*b*) Stretcherman details.

(*c*) General instructions.

V. Communication Control

(1) *Communication officer,* station, conning tower.

(2) *Items to be covered in Battle Bill.*—(*a*) Stations to be manned and personnel thereat for each condition of readiness, and procedure for passing from one condition to another.

(*b*) Succession of reliefs for personnel at each station.

(*c*) Casualties and procedure.

(*d*) Interior communication between various stations.

(*e*) Exterior communications.

(*f*) Radio direction-finder plotting and tracking.

(*g*) Coding and decoding boards for all conditions of readiness.

Training at battle stations.—The battle exercises are not to be considered as periods of training so much as test of training. The above groups shall receive their battle training independently.

Final preparations for battle.—These shall be made when battle is imminent, or when standing by in thick weather, or before sunset. In daylight, the call to general quarters is the signal for final preparations. Circumstances will govern in the case of certain final preparations. At night, the guns must be kept cleared and manned by the watch. The extent to which men off watch may turn in hammocks will depend on circumstances.

GENERAL QUARTERS

General quarters calls the ship's company to stations.

General duties.—Man battery and take battle stations.

Load torpedoes.

Connect fire hose.

Stand by manifolds and valves.

Stand by cut-out switches and switchboards.

Test out all gear.

Note.—Every officer and man must occupy his battle station at general quarters. Fleet working parties and ship's work and boating must give way to general-quarters routine.

The calls.—(1) *General quarters signals.*—(*a*) General alarm.
(*b*) *General quarters* on the bugle.
(*c*) *General quarters* over interior-communication system.
(2) *Secure signals.*—(*a*) *Secure* on the bugle.
(*b*) *Secure* over the interior-communication system.

Reports.—(1) *Ready.*—To be made over fire-control and interior-communication systems.
(*a*) Gun divisions and fire-control stations report to chief fire control.
(*b*) Engineering stations report to chief engineer at engine control.
(*c*) Engine control, ship control, battle lookouts, communication stations, battle dressing stations, repair parties report to damage control officer in central station.
(*d*) Chief fire control reports to captain and damage control officer.
(*e*) Damage control officer reports to captain.
(2) *Secure.*—Same as for *Ready.*

The exercise.—(1) Thorough preparation shall be made for every general-quarters exercise, and a definite program shall be drawn up and followed at this drill, during which casualties shall be simulated.

(2) The training of units of the battle organizations and gun crew should not be attempted at general quarters except to simulate casualties to personnel and material. Gun crews and other units are expected to be expert before the ship goes into action, and they should be brought to thorough proficiency before seriously taking up the problems of general quarters.

(3) The action taken on each casualty shall be investigated. Casualties shall be given in such manner and at such time as closely to approximate a real casualty. The patrol and communication system of the ship must be used in all lower-deck casualty drills to determine (1) that there is a casualty; and (2) that the proper action is taken to handle the casualty. Great thought and care must be exercised to introduce all possible conditions which exist with each casualty, for example, a shell bursting on second deck. All the probable damages due to the burst should be simulated.

(4) All vessels should provide, in organization, for the details and necessary action to be taken to safeguard personnel from explosives or poisonous gases. A standard form of signal for gas alarm should be installed and used for no other purpose. At this alarm all personnel should put on gas masks in accordance with instructions which may be issued from time to time by the department. These masks should be stowed in such a place that they may be manned quickly and yet be free from the destructive effects of shell burst.

Necessary measures must be provided for to prevent the inflow of gases to the vitals of the ship through the ventilating system. Under present conditions all compartments below must receive adequate notice of gases and immediately use gas masks.

At least once a month there should be periodical instruction given to the personnel regarding gas: the different kinds of gas, how detected, the danger of same, and the best thing to do under all circumstances. Inasmuch as there are possibilities of using gas bombs from planes, it is of equal importance to provide the gas protection for all gunnery personnel stationed in the tops, conning tower, or upper decks. Inasmuch as such personnel can best observe the enemy's shell bursts, it is recommended that specially trained lookouts be designated to observe gas shells and report when the gas alarm should be sounded. As is well known, in the World War the gas alarm in the trenches had to be obeyed instantly, and in some cases, where mustard gas was used, at the beginning too little heed was paid to protect against this method of warfare. Therefore, in case of doubt, it is best to sound the gas alarm and all hands wear gas masks. The work of personnel in peace-time training should be carried on under conditions simulating a gas attack.

FUELING SHIP

Fueling and coaling ships should always be considered as emergency drills and, as such, all-hands jobs. A ship rigged for fueling is temporarily unfit for battle, and every effort should be made to reduce as far as possible the time necessary for this evolution. It is only by drill in this manner that the crew will become proficient in fueling ship.

CHAPTER 27

J—REGULATIONS IN REGARD TO UNIFORM AND CLOTHING

Regulations for marking clothing 235
Prescribed outfit 235
Uniform of the day 238
Side arms, leggings, etc. 240
Pins and jewelry 240
The hair and beard 240
Geneva-cross and shore patrol brassards 240
Custody of clothing, arms, and accouterments 241
Regulation clothing 241
Rain clothing 241
Laws affecting the uniform 242
Neckerchiefs 242
Care of clothes 242
Requisitions for clothing 243
Fresh water 244

REGULATIONS FOR MARKING CLOTHING

EVERY article of clothing shall be clearly marked with the owner's name, using black paint in marking white clothes and dungarees, and white paint on blue clothes, or with pen and indelible ink when labels are provided for the purpose. The manner of marking is explained fully on page 9.

PRESCRIBED OUTFIT

Prescribed outfit for men.—The minimum outfit of clothing, etc., for enlisted men at sea shall be as given in the following table. On shore and in the tropics, the outfit of clothing may be reduced at the discretion of the senior officer present.

Outfit	Chief petty officers	Officers' stewards and cooks	All other enlisted men
Aprons, cooks		2[8]	2[8]
Belt, woven, black		1[7]	1[7]
Blankets, pair	1	1	1

Outfit	Chief petty officers	Officers' stewards and cooks	All other enlisted men
Blacking outfit	1	1	1
Broom, whisk	1	1	1
Brush, scrub			1
Brush, tooth	1	1	1
Brush, hair	1	1	1
Cap, complete	2	2	1
Cap, covers, blue and white	1	1	
Cap, watch			1
Clothes, stops, package			3
Coat, blue	2	2	
Coat, white	4	4	
Comb, hair	1	1	1
Cravat	1	1	
Drawers, heavy	2[5]	2[5]	2[5]
Drawers, light or medium	4	4	4
Dungarees, suits	2[6]		2[6]
Gloves, woolen, pair	1[5]	1[5]	1[5]
Gloves, working, pair	1[4]		1[4]
Handkerchiefs	12	12	12
Hat, white			3
Jacket, white		4[1]	4[1]
Jackknife	1		1
Jumper, dress blue			1
Jumper, undress blue			2
Jumper, undress white			3
Jerseys			1
Leggings, pair	1	1	1
Mattress	1	1	1
Mattress covers	2	2	2
Neckerchiefs			1
Overcoat	1	1	1
Overshoes	1[4]	1[4]	1[4]
Pillows	1[4]	1[4]	1[4]
Pillow covers	2[4]	2[4]	2[4]
Raincoat	1[4]	1[4]	1[4]
Rating badges, as required by petty officers			
Sewing kit, as required	1	1	1
Shirts, chambray	2[4,7]		2[4,7]
Shirts, flannel	2	2	
Shirts, white	6	6	
Shoes, pair	2[2]	2[2]	2[2]
Shoes, gymnasium	[3]	[3]	[3]

Outfit	Chief petty officers	Officers' stewards and cooks	All other enlisted men
Socks, cotton	4	4	4
Socks, woolen	2[3]	2[3]	2[3]
Specialty marks, as required			
Toilet articles, outfit	1	1	1
Towels	2	2	2
Trousers, blue	2	2	2
Trousers, white	4	4	4
Trunks, bathing	1	1	1
Undershirts, heavy	2[5]	2[5]	2[5]
Undershirts, light or medium	4	4	4
Waistcoat	1	1	1

[1] Officers' mess attendants only.
[2] One pair to be high.
[3] As required.
[4] Possession optional.
[5] Possession optional except in rigorous climate, where issue may be directed in the discretion of the commanding officer.
[6] For such ratings as are required to have.
[7] For all ratings required to have dungarees.
[8] For cooks, officers' cooks, bakers, and messmen.

A man may own more clothing than the outfit requires provided he desires to do so, that it is of authorized pattern, and that it is conveniently stowed.

In the event of men who have not sufficient pay due them to entitle them to draw clothing or small stores, the captain may, in case of urgent need, direct such articles as he considers absolutely necessary to be supplied.

Uniform clothing.—Men are required to provide themselves with correct uniforms as laid down by the *Uniform Regulations, United States Navy*. This includes all uniforms, insignia, devices of their rating, and all medals or orders. The uniform, with its various insignia and devices, is designed primarily to indicate on sight those belonging to the naval service; to show at a glance their rating, and hence the authority and responsibility imposed by law upon those wearing it. It should be a matter of pride with men in the naval service to be habitually neatly and smartly dressed and to see that their uniforms are scrupulously clean. There is no question but that those who are properly and smartly dressed

at once create a far better impression than those who fail in this respect or who wear ill-fitting or stained clothes.

Enlisted men are not allowed to have civilian clothing in their possesion on board ship. Enlisted men may be permitted to wear civilian clothes when on leave or liberty in United States ports, but they shall not wear civilian clothing ashore in a foreign port. No part of the uniform shall be worn at the same time as civilian clothing except overcoat, raincoat, jersey, underclothing, socks, gloves, shoes, and overshoes. When on duty, or when ashore in a foreign port, enlisted men of the Navy and Marine Corps shall wear the prescribed uniform, whether serving on shore or afloat.

UNIFORM OF THE DAY

The uniform to be worn for the season, day, or occasion is prescribed by the senior officer present. In the fleet the uniform of the day is worn by all petty officers, signalmen, and others on watch above decks and by the crews of running boats and power boats; by all persons above decks at *All hands* when going in or out of port; and generally by men above decks and in common living spaces; but commanding officers may prescribe or permit working dress for other persons as may be most suitable to the exercise of duty of the ship at the time.

A dress board, on which will be indicated the uniform of the day for the crew, is kept posted in a conspicuous place.

When embarked on Army transports, those of the naval service wear the uniform prescribed by the senior line officer or marine line officer embarked. The prescribed uniform as far as practicable conforms to that prescribed by the officer commanding the troops embarked.

Exceptions to regular uniform of the day.—Cooks at work in the galleys wear white undress (without neckerchiefs), bakers' and cooks' caps, and white aprons. When not on duty there, they shall wear the uniform of the day. Messmen while performing their duties as such wear white undress, without neckerchiefs (marines, the corresponding uniform), and they may wear this uniform any time below decks, but at quarters and off duty they wear the uniform of the day. Mess attendants on board ship wear the white jacket, with white or blue trousers, according to the prescribed uniform of the day. When leaving the ship, they wear the same uniform as other enlisted men.

In warm weather, chief petty officers who may be engaged in work which might stain, soil, or wet their clothing may be permitted to remove their coats.

At and in isolated anchorages for target practice or similar service, when hot weather or other conditions render it desirable, the uniform of the day for enlisted men may be modified by omitting the jumper, chief petty officers leaving off the coat and wearing shirts, with belts instead of suspenders for the trousers. This uniform will be indicated by signal, and particular care must be taken that none but a clean uniform undershirt is worn and that a neat appearance is preserved at mess. All cooks, mess attendants, members of the guard, and other enlisted men that have occasion to enter officers' quarters shall not wear this uniform, and crews of running boats will be exempted unless otherwise especially directed.

Commanding officers may require men to wear the jumper as they may think advisable, lest it be a hardship to someone who, being off watch, for instance, has no work to perform; but in units such as boats' crews or signalmen, all must be dressed alike.

The foul-weather clothing and raincoats may be worn as circumstances warrant.

Dungarees of the prescribed pattern may be worn by enlisted men when engaged in work which by reason of its nature would soil their other uniforms. This pertains more particularly to those in the engineer's force; to artisans and mechanicians; to the deck force when scaling or painting ship or handling stores; to the crews of repair, supply, and fuel ships during working hours or when handling stores or fuel; and to the crews of submarines when under way or during working hours in port; and to the aviation force at shore stations when overhauling or repairing aircraft, or engaged in their maintenance or upkeep. In no case should this be interpreted to apply to those off duty, to men when not engaged in work which might soil their other uniforms, nor as a regular uniform of the day. It is prescribed for those on watch, on duty, or while so engaged in the aforementioned cases of work, and at all other times everyone must conform to the regular uniform of the day. In entering or leaving port, dungarees are not allowed on the upper decks and are not worn by any others than those on watch in the engineer's department. They are not worn in port at any time other than by those who are actually required to do so; or by anyone at shore stations except at their places of work or in going between such places of work and their living quarters. No other dungarees than those of regulation uniform are allowed.

Blue shirts with soft blue turned-down collars may be worn when prescribed by the senior officer present.

SIDE ARMS, LEGGINGS, ETC.

Leggings are worn by enlisted men of the Navy with any form of dress when under arms for parade or ceremony, or infantry or artillery drill, or a landing party, or on guard detail, or when on duty ashore as patrol or beach-master's guard, or as mail orderly. With leggings, high black shoes are worn by enlisted men.

When the revolver is carried, the belt is worn outside of every coat, including the overcoat, the revolver being worn slightly in front of the right hip. The cartridge attachment worn with the sword belt is worn in front and to the right and left of the belt buckle. If only one cartridge attachment is worn, it shall be to the right of the buckle.

A petty officer on boat duty, in charge of guard boat, or on other special duty is required to wear the service revolver belt, but this provision does not apply to the coxswain of a boat unless the crew of the boat is armed.

Men wearing side arms shall not remove their caps or other head covering except indoors.

PINS AND JEWELRY

No watch chains, fobs, pins, or other jewelry may be worn exposed upon the uniform by enlisted men of the Navy or Marine Corps, except that authorized decorations, medals, ribbons, honorable discharge buttons, etc., may be worn as prescribed.

THE HAIR AND BEARD

The hair, beard, and mustache must be worn neatly trimmed. The face must be kept clean shaved, except a mustache or beard and mustache may be worn at discretion. No eccentricities in the manner of wearing the hair, beard, or mustache are allowed.

GENEVA-CROSS AND SHORE PATROL BRASSARDS

The Geneva-cross brassard consists of a band of white cotton bearing a red Geneva cross painted or stitched on the band, to be fastened around the upper part of the right arm over the outer garment. The band is 4 inches wide, the cross 3 inches in height and width, and the arms of the cross 1 inch wide. It is worn by ambulance and first-aid parties.

The shore-patrol brassard consists of a band of Navy standard, 18-ounce cloth surcharged with gold block letters SP stitched on the band. It is worn by members of the shore patrol and beach guard while on

duty, over the outer garment on the opposite arm from the rating badge, halfway between the shoulder and the elbow.

CUSTODY OF CLOTHING, ARMS, AND ACCOUTERMENTS

The clothes, arms, military outfits, and accouterments furnished by the United States to any enlisted person in the Navy or Marine Corps, or required by such persons as a part of their prescribed uniforms or outfits, may not be sold, bartered, exchanged, pledged, loaned, nor given away without authorized permission.

No transfer or exchange of clothing may be made without the authority of the commanding officer. When clothing belonging to deserters is sold, the name of the deserter is obliterated with a stamp marked D. C. and the purchaser's name is placed upon it as soon as possible.

REGULATION CLOTHING

All wearing apparel drawn from a supply officer or from the quartermaster's department of the Marine Corps is considered uniform.

Clothes made by the men for themselves, made by ships' tailors for them, or received by them from other than official sources must conform strictly in material, pattern, and make-up to those issued by the government.

Standard samples, as approved by the Bureau of Navigation, of every article of enlisted men's uniforms are kept at the Naval Clothing Factory or in the Quartermaster's Department of the Marine Corps. The articles issued to ships must conform in every respect to standard samples, and no change is permitted without the sanction of the Secretary of the Navy.

RAIN CLOTHING

Two types of rain clothing are prescribed for men, foul-weather clothing (oilskins, boots, and sou'westers) and light raincoats.

The foul-weather clothing as prescribed and issued to ships as equipment, with or without rubber boots, may be worn by men in foul weather at sea or in port, including getting under way and coming to anchor, and also by entire crews of boats, unless specially ordered not to be worn. When the weather is too cold to go barefoot, men may wear rubber boots during wet weather or while washing down the deck, but rubber boots shall not be worn by the crews of steam or power boats.

The raincoats specified for men are not designed for heavy-weather service, but for inclement weather, as when going from shelter to shelter, on liberty, and like service.

LAWS AFFECTING THE UNIFORM

By acts of Congress and the legislatures of the various states, it is a misdemeanor to discriminate against any person lawfully wearing the uniform of the Army, Navy, Coast Guard, or Marine Corps.

It is unlawful for any person to wear the uniform of the Army, Navy, Coast Guard, or Marine Corps unless he is a member of these organizations or otherwise entitled to wear it by law.

Enlisted members of the Naval Reserve, when on active service, are subject to the laws, regulations, and orders for the government of the regular Navy, and the Secretary of the Navy may, in his discretion, permit the members of the Naval Reserve to wear the uniform of their respective ranks, grades, or ratings while not in active service, and such members shall, for any act committed by them while wearing the uniform of their respective ranks, grades, or ratings, be subject to the laws, regulations, and orders for the government of the regular Navy.

NECKERCHIEFS

Boatswain's mates, quartermasters, guard petty officers and other petty officers on watch, mail orderlies, buglers, messengers, side boys, sentries, men on guard or patrol duty, and the coxswains of all boats shall wear the neckerchief with undress, blue and white, except on occasions when prescribed. Bodies of men under arms, including their petty officers, shall not wear neckerchiefs with undress except the guard.

CARE OF CLOTHES

General care.—No matter how well fitting a uniform, and especially a blue one, it will not continue to look its best unless it is carefully folded and put away after each using. The carrying of large or heavy objects in the pockets will speedily destroy the shape of any clothing.

To prevent moths.—Frequent brushing and exposure to sunshine and fresh air will effectually prevent moths. If uniforms are to be put away for a long time and left undisturbed, pack away with camphor balls, cedar wood, or balls of cotton saturated with turpentine.

To remove oil or grease from blue uniforms.—Soak a piece of blue cloth in chloroform, petroleum, benzine, benzol, or acetone and rub the spot briskly. The stain will be washed out. The solvent will rapidly evaporate.

To remove kerosene.—Wash in a solution of warm soapy water.

To remove stains from blue uniforms.—Paint stains will be removed in a manner similar to that given above for oil or grease while

paint stains are still fresh. Old and hard paint stains are difficult to remove, sometimes impossible. The best treatment for old paint stains is to rub them hard with a piece of blue cloth saturated in turpentine.

Paraffin, wax, etc.—Place blotting paper over spot and apply hot iron. Continue with clean blotting paper until the spot is removed.

Iodine stains are removed by a solution of "hypo," also called "antichlor" or sodium hyposulphite, and then rinsing thoroughly with water. May also be removed by immersing the stained part in laundry starch and boiling. The stain first turns blue and then disappears.

Chocolate.—Cover stain with borax and wash with cold water, then pour boiling water on the stain and rub vigorously between the hands. When dry, sponge with a little naphtha, chloroform, or benzine.

To remove rust, ink, or fruit stains from white uniforms.—Soak the stained part in a strong solution of oxalic acid, or put some powdered oxalic acid or sodium or potassium acid oxalate on the stain, previously moistened with water, and rub with a piece of white cotton or linen. The stain will dissolve and wash out with water. Oxalic acid and its soluble salts are poisonous, and should be handled with care.

Mildew.—If stain is recent, simply wash with cold water. If there is an old stain, it will be necessary to bleach.

To remove shine from serge uniforms.—Steam the spot by laying a wet cloth over it and pressing with a hot iron. Then rub with 00 sandpaper or emery cloth. This had best be done by a regular tailor.

A clean cut in a serge or cloth uniform can be repaired by being rewoven with threads drawn from the material in another part of the garment. This must be done by a regular tailor and is expensive.

To remove a singe mark.—A light singe mark on blue serge or cloth should be rubbed vigorously with the flat side of a silver coin. This will in many cases make great improvement in appearance. It is, however, not effective in the cases of bad singes or scorches.

REQUISITIONS FOR CLOTHING

Each ship has a schedule of days on which various divisions may draw clothing. On these days the men will draw blank requisitions from their division petty officers, fill them out for the clothing they desire, and turn them in to their division officer for approval. The division officer will then sign these requisitions and turn them over to the supply officer. At the hour specified the men will go to the small-store issuing room and draw the clothing as approved on their requisitions. The storekeeper who issues this clothing will make out a small-store slip in duplicate, showing the price of each item and the total cost of all the

clothes drawn. The original will be turned over to the supply officer who will deduct this amount from the pay of the men, and the duplicate is given to the man for his information.

Men who are in debt to the government due to sentence of court-martial or other causes can draw clothing only on approval of the commanding officer and then only on account of necessity for health and comfort. These men make out their requisitions and submit them to the division officer as the others, but must explain that they are for their health and comfort. After approval by the division officer, these requisitions are sent to the executive officer for transmission to the commanding officer.

Division officers inspect all articles of uniform drawn by their men for proper fit. Minor alterations are made by the ship's tailors at moderate cost. In case of badly fitting clothes, the division officer directs their exchange for better fitting clothes. After inspection by the division officer the men mark their clothes in accordance with regulations.

FRESH WATER

All men must learn to conserve fresh water as much as possible, as it is obtained at great expense on board ship. All the fresh water used in the boilers is made aboard ship by the evaporators from sea water. The fresh water for drinking, etc., is also made by the evaporators, but this is sometimes obtained from water barges in ports where good water can be obtained more cheaply than it can be made. The capacity of the fresh-water tanks aboard ship and the capacity of the evaporators are limited, and it is only by close co-operation of all hands that an adequate supply of fresh water can be maintained. *Careless use or wastage of fresh water is not tolerated.*

CHAPTER 28

K—PERSONAL HYGIENE AND FIRST AID

Personal hygiene 245
Elementary first aid 247
Wounds in general 248
Hemorrhage or bleeding 250
Application of first-aid dressings 254
Sprains, dislocations, and fractures 256
Methods of carrying the wounded 262
Use of regular and improvised stretchers 275
Other injuries 277

PERSONAL HYGIENE

General.—So much sickness and suffering is caused by ignorance of the simplest matters pertaining to personal hygiene and it is so easy to learn the fundamental rules necessary to preserve health that every man should study and follow the advice given herewith.

Personal hygiene teaches us to keep both our minds and bodies healthy. It is easy for the mind to form a habit, even as other habits are formed. By keeping the mind occupied in the work assigned you, by taking an interest in professional studies, by athletics and clean recreation, and by reading good books, you can develop your mind in a healthy manner. Smoking to excess, drinking intoxicating liquor, and associating with bad women can ruin your bodily health. Bad women especially are the cause of much grief, as promiscuous intercourse with them frequently results in loathsome diseases which not only often leave their effects on your system the rest of your life, but also may be transferred by you to your future family with disastrous results. Sexual intercourse is positively not necessary for health and proper manly development. In spite of warning, if you have exposed yourself to venereal disease, you must report to the sick bay for treatment. The sooner you do this the better, as the germs multiply rapidly, and in a few hours after exposure the prophylactic treatment will be ineffective However, prophylactic treatment is not a sure preventive. The only sure way is to avoid exposure entirely.

Note.—The development of a venereal disease involves loss of pay for the time a man is incapacitated so as to be absent from regular duties.

Personal cleanliness.—The hair and beard must be kept trimmed in the regulation manner. The teeth must be brushed twice a day and kept in good condition by a visit to the dentist at least once every 6 months. Clothes must be kept clean and only clean clothes worn after working hours or drills. Baths must be taken frequently, especially after strenuous work or drills, and clean underwear put on. The best type of bath is the shower, as it is the most sanitary. Hands must be kept clean, including the finger nails, and should always be washed before eating and after visiting the head. Mattress covers should be changed and bedding aired weekly. Personal cleanliness is especially necessary aboard ship, as men live so closely together that infectious diseases can be spread rapidly to many men in a short time and infectious diseases thrive whenever personal cleanliness is not carefully maintained.

Care of the body.—Food must be chewed properly in order that it may be ground and mixed with saliva in a proper manner for digestion. Eating rapidly and bolting the food may cause indigestion.

Feet should be bathed at least once a day; cold water hardens them, while hot water softens them. Clean, dry socks that do not wrinkle should be worn at all times. The nails should be cut straight across and kept trimmed close. Corns should be treated at once, preferably in the sick bay, as otherwise they will give trouble. Blisters should be treated at the sick bay without delay, as they may become infected and cause you to be laid up. Do not delay reporting to the sick bay for any trouble with your feet.

It is well to have 2 or even 3 pairs of shoes and wear them in rotation, as it gives them a chance to dry out after being dampened by the perspiration from the feet. No 2 pairs of shoes make pressure equally on the same part of the feet; therefore, by changing shoes you rest and allow to heal parts of the feet that have been rubbed or subjected to undue pressure. Blisters can often be avoided in this way. Do not dry shoes rapidly, as this causes them to become hard and leads to blisters and corns.

We usually catch colds because we neglect to put on a sweater or overcoat after being overheated by hard work, or when going from a hot compartment into the cold air, or when sleeping in a draft without sufficient covering. Never sit in a draft to cool off when perspiring, as the evaporation of the perspiration may cause chills or pneumonia to develop. Take a bath as soon as possible and shift into dry, clean clothes. If you work in the rain and get wet, keep moving until you have a chance to take a bath and shift clothes.

Summary.—(1) A daily cold bath followed by a brisk rub is beneficial to health.

(2) The hands should be washed before each meal, and immediately after using the head.

(3) Teeth should be brushed at least twice a day, especially at night.

(4) Exposure to venereal disease should be avoided but, if exposed, wash parts immediately with soap and water; then use prophylactic treatment.

(5) Intemperance in eating and drinking should be avoided. Men who drink alcoholic liquor are more apt to get sick than those who abstain.

(6) Daily exercise is conducive to good health.

(7) Periods of work should be followed by periods of relaxation, rest, or recreation.

(8) Sufficient time should be allowed for meals; the food should be chewed thoroughly.

(9) Bedding should be aired as often as practicable. Sunlight kills disease germs.

(10) The hair should be kept short and the finger nails trimmed and clean.

(11) Contact with the sick should be avoided unless duty requires it.

(12) Plenty of water should be drunk, but do not drink a large amount at any one time, especially when overheated.

(13) Underclothes, shirts, and socks should be clean. This is especially important before going into battle, as soiled clothes predispose to wound infection.

(14) The mental attitude has a close relationship to health. Worrying and anxiety over trifles should be avoided; to accomplish this the mind should be kept occupied and interest maintained in work and recreation.

ELEMENTARY FIRST AID

General

Know what to do.—It is a very good rule to leave an injured man alone unless you know exactly what to do. Also protect him from the inexperienced efforts of others. Imagine yourself in the injured man's position before you act. Usually the service of a pharmacist's mate or the medical officer aboard ship and police ambulance ashore can be obtained. If so, simply protect the man from further injury, send for trained help, and give only what treatment seems necessary to meet some

emergency. Familiarity with the instructions that follow will teach you to meet most emergencies in an intelligent, helpful manner.

The best treatment is to be so familiar with your work and the hazards involved that you avoid injury. The average injury is due to either carelessness or ignorance. Both are avoidable. Be thoroughly familiar with all the dangers involved in your work. The Navy from long experience has developed safety regulations and appliances. Be familiar with and apply both and enforce similar action by your associates. Regret may be sincere but is poor compensation for irreparable injury to yourself or others.

Knowledge of first aid.—It is the duty of every man to familiarize himself with the details of first aid, so that he may be able to give efficient help to wounded comrades and, in case of necessity, direct or assist in efforts made in his own behalf. By first aid is meant the measures that should be employed in the immediate treatment of injuries caused by various accidents.

Efficiency in first aid can be attained only by thorough drilling. In order to save life, someone on the spot must be able to render assistance to the injured.

WOUNDS IN GENERAL

A wound is any injury in which the skin is pierced or broken. The skin ordinarily acts as a protective covering for the body and prevents the entrance of pus germs; but a break in the skin may allow germs to enter the system which can cause inflammation, formation of pus, or blood poisoning. These germs can only be seen with a powerful microscope; but we know that they are found practically everywhere, on the surface of our body (especially on the hands) and on anything which may cause a wound. Consequently, in any wound, except those made by a surgeon, whose training has made it possible for him to prevent infection, there are a certain number of germs introduced. Many of them are washed out by the bleeding which occurs, and the tissues of the body generally destroy the remaining ones. We find such wounds heal rapidly with very little, if any, pus formation. In wounds made with sharp instruments there are fewer germs introduced than in those made by blunt instruments. There is also less damage to the tissues, and the uninjured cells of the body are better able to destroy germs than the bruised tissues which result from wounding with blunt instruments.

One of the important duties is to prevent wound infection. This is accomplished in part by the men being so well trained in first-aid methods and the application of first-aid dressings that they can intelli-

gently treat not only their own wounds but those of their comrades. The measures for preventing wound infection are extremely simple and are effective in saving life, preventing suffering, and in hastening recovery. Therefore sterilized dressings are used to protect wounds from infection. Iodine is the best chemical to kill bacteria that have lodged in wounds. Wounds should be treated with iodine on the assumption that they are infected.

It is always best to have a doctor see the wound, if he is available. Turn back or cut away clothing from the wound. All clothing may be a source of infection. If there is severe bleeding, check it before applying the first-aid dressing.

Minor wounds or wounds resulting from crushing injuries may be treated as follows:

(1) Do not touch the wound with the hands or allow the injured person to do so.

(2) Swab the wound freely with iodine or turpentine, using a small brush or piece of cotton on a stick.

(3) Apply first-aid dressing over the wound.

(4) If there is much delay before reaching a doctor, the parts around the injury may be carefully cleansed, provided the first-aid dressing over the wound is in no wise disturbed.

When confronted with major wounds, the following instructions should be followed:

(1) Do not touch the wound with the hands or allow the injured person to do so.

(2) Do not wash it, as water contains germs and may infect the wound.

(3) Do not use antiseptics such as bichloride of mercury and carbolic acid, for if used too strong the cells of the tissues may be destroyed, and their assistance is lost in fighting the infection.

(4) The best way to prevent infection is to cover the wound with a sterile dressing, such as is contained in a first-aid packet. This should be bound on at once and will help to check slight bleeding.

It is better to leave the wound exposed to the air than to apply a dressing which is not sterile, as a wound is not apt to become infected from the air.

(5) Iodine solutions are very valuable in the treatment of wounds, as they will kill many of the germs. Paint the wound freely with a small brush or a piece of cotton on a stick.

(6) Do not use iodine near the eyes.

(7) For directions in use of first-aid packet, see "The application of first-aid dressings" (page 254).

HEMORRHAGE OR BLEEDING

Bleeding from an ordinary wound is usually stopped by exposure to the air or by the pressure of a wound dressing. In more severe cases, some other method must be used, and quickly. Knowledge of methods of stopping hemorrhage may be the means of saving life. There may be no visible bleeding from internal hemorrhage.

Excessive loss of blood may cause faintness, cold skin, pallor of face, dilated pupils, feeble and irregular breathing, often sighing, a weak pulse, and eventually loss of consciousness.

Bleeding from arteries is most serious and is recognized by bright red blood expelled in spurts. The blood may be lost very rapidly.

Bleeding from veins is characterized by a steady flow of dark blood and is only dangerous when from very large veins.

Bleeding from capillaries, which are the smallest blood vessels, is usually oozing blood.

Treatment.—Check the hemorrhage. Some knowledge of the general course of the main arteries is necessary. This may be obtained from a study of Fig. 28-1. Also feel for the pulsation of these arteries in your own body to become familiar with their location and the amount of pressure necessary to arrest the flow of blood.

Press the fingers or the thumb on the artery between the bleeding point and the heart. Finger pressure is tiring and cannot be kept up very long (usually not longer than 15 minutes), so other methods must be used to control the hemorrhage until clotting has taken place and the bleeding permanently stopped.

(1) Bleeding from any part of the scalp may be stopped by a tight bandage encircling the head, across the forehead, above the ears.

(2) All other arterial bleeding from the head and the upper part of the neck should be checked by pressure on the carotid artery which supplies that region. Press backward deeply into the neck with the thumb or fingers to the inner side of the plainly visible muscle which extends from the upper part of the breastbone to behind the ear (Fig. 28-2).

(3) Wounds of the great vessels of the neck are so extremely dangerous that direct pressure on the bleeding point should be made at once.

(4) Bleeding about the shoulder may be checked by compressing the subclavian artery behind the middle portion of the collar bone (Figs. 28-1 and 28-3).

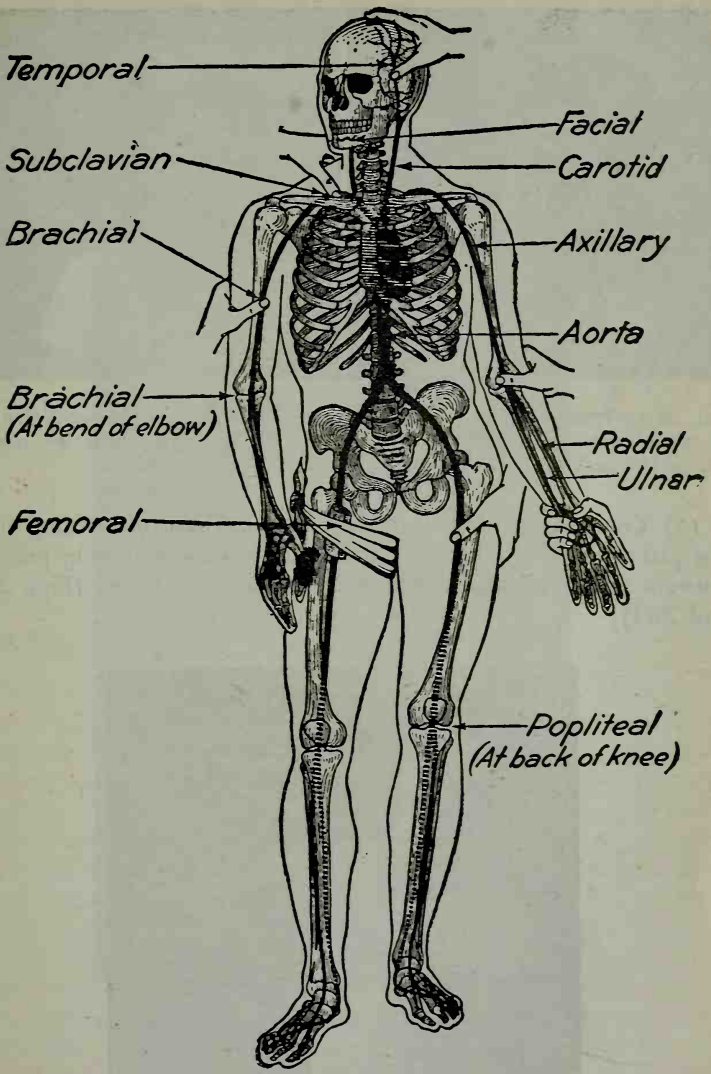


FIG. 28-1—Skeleton with black and dotted lines showing the course of the arteries and the pressure points.

FIG. 28-2—Pressure on carotid artery to control bleeding from head and upper part of neck.

FIG. 28-3—Pressure on subclavian artery behind collar bone to control bleeding about shoulder.

(5) Compression of the brachial artery will control bleeding from any part of the arm or hand. This artery may be compressed by pressure outward against the bone at the inner border of the biceps (Figs. 28-1 and 28-4).

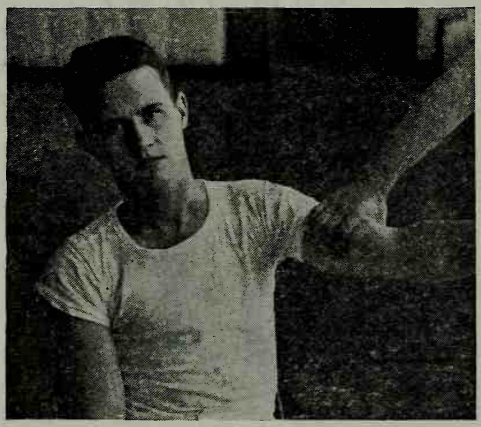


FIG. 28-4—Pressure on brachial artery to control bleeding in arm and hand.

(6) In bleeding from the lower extremity, pressure on the femoral

artery will control it. This pressure should be made at the middle of the groin, four fingers' breadth below the fold (Figs. 28-1 and 28-5).

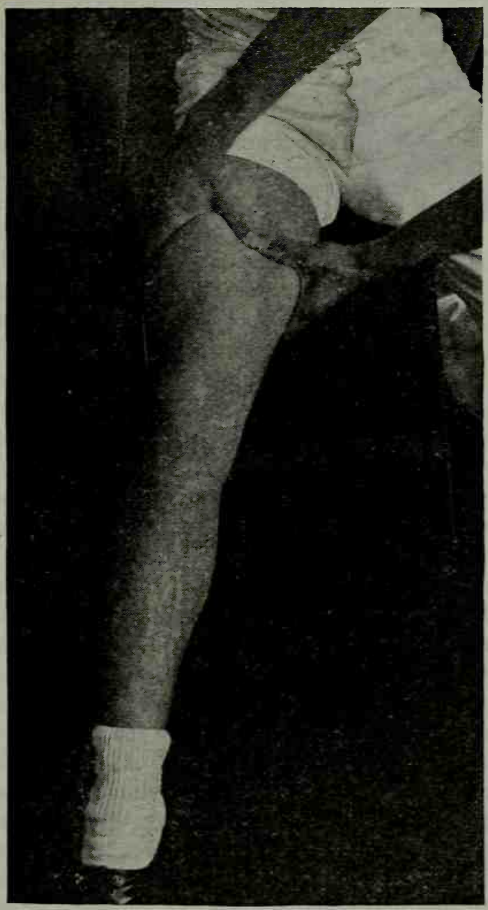


FIG. 28-5—Pressure on femoral artery to control bleeding in lower extremity.

(7) Bleeding from the leg may be controlled by placing a pad behind the knee and bending the knee sharply on the pad. Apply a bandage to keep the leg against the thigh. This method may be used at the elbow.

A tourniquet is an appliance used to constrict the arm or the thigh, and by so doing control hemorrhage. There are many forms of tourni-

quets, most of them having a pad to press the artery and a strap to apply pressure. One may be improvised with a smooth stone wrapped in some material or a handkerchief or other similar article (Fig. 28-6). The Navy tourniquet is an elastic rubber tube. This should be bound tightly around the limb and its ends secured by tying. The tourniquet is very useful but may be very dangerous. It should not remain on longer than 20 minutes without loosening, as there is danger that the lack of blood supply will cause death of the part. If the bleeding starts again, then pressure must be applied as before. If pressure is made in the wound itself, place a first-aid pad or a clean piece of cloth over the wound and make pressure through this. Only if absolutely necessary should a finger come in direct contact with a wound.

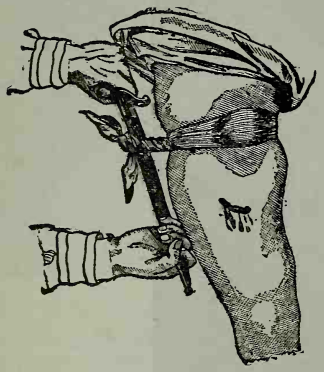


FIG. 28-6—"Spanish windlass."

Remember that the foregoing methods, finger pressure or tourniquet, are mainly used in checking bleeding from larger arteries.

Arteries are thick-walled vessels, carrying blood from the heart to the extremities under considerable pressure. Hence considerable pressure applied directly to these vessels is needed to occlude them and stop bleeding from them. The case with veins is quite different. These are thin-walled vessels returning the blood to the heart under very little internal pressure. Hence the compression afforded by a first-aid dressing firmly applied to the wound will almost always effectively stop venous bleeding. Not infrequently a man comes to sick bay with a snug but not tight tourniquet about the arm, and bleeding freely from the hand. On removing the tourniquet and raising the hand the bleeding immediately stops. In such a case the tourniquet was not necessary; it was applied firmly enough to occlude the veins and prevent the blood returning to the heart, but not tightly enough to occlude the arteries and keep the blood from entering the hand. It is easy to see how a tourniquet so improperly applied will of necessity aggravate rather than stop bleeding.

Elevation of the part aids in controlling hemorrhage.

APPLICATION OF FIRST-AID DRESSINGS

The first-aid packet contains two compresses made of folds of gauze bandage and two safety pins. The dressings are wrapped in wax paper

inside a water-proof metal case. The two compresses are for the two wounds, that of entrance and that of exit of a bullet. Gauze tails hold the compresses in place and may be secured with the safety pins.

Skill in the application of these dressings can be acquired by frequent drills.

Large dressings are furnished for use on shell wounds. They are backed by muslin and have four tails for securing around the body. The muslin goes outside and the gauze next to the wound. Open the package and apply without touching the gauze with the fingers.

The immediate treatment of gunshot wounds differs in some particulars from the treatment of wounds in general.

(1) Under no circumstances attempt to disinfect or wash the wound.

(2) The wound is not to be touched with the fingers. Avoid handling that part of the dressing which will come in contact with the wound. The danger of infection from fingers is very great and may lead to more serious results than the bullet itself.

(3) Care must be taken that the compresses do not slip off the wound.

(4) In dressing wounds of the scalp, part the hair or cut away some of it before the compress is applied.

(5) If necessary, the clothing should be slit with a knife.

(6) The majority of wounds heal under a single dressing.

(7) Under no circumstances should dried blood crusts and scabs be disturbed.

Wounded person's care of himself.—Apply the first-aid dressing and compress the bleeding vessel in the wound through this dressing. Elevate the part and loosen constrictions. Lie down and remain quiet. If the bleeding is profuse, press the great vessel supplying the part against the bone and apply a "Spanish windlass" made with a neckerchief or a triangular bandage and tightened with a stick or bayonet. After checking a dangerous hemorrhage, the prevention of infection is of the greatest importance. Carefully get out the first-aid packet, seeing that none of its contents is dropped on the ground and that the fingers do not touch the parts of the compress likely to lie in contact with the wound. Do not disturb crusted blood on the dressing near the wound. If the wound is out of reach and cannot be dressed at once, it should be left exposed to the air until assistance comes. If there is little pain, no throbbing, and no fever, be contented, for the wound is doing well and will probably heal under a single dressing.

SPRAINS, DISLOCATIONS, AND FRACTURES

A sprain is a twisting or tearing, in greater or lesser degree, of structures which surround and support a joint. There is always a resulting rupture of some small blood vessels, so blood and blood serum (the liquid part of the blood) escape around the joint and sometimes into the joint. Fractures frequently accompany sprains and dislocations.

Signs: Pain, aggravated by movement or weight bearing, tenderness to pressure, and swelling, often followed by discoloration of the skin. The ankle, knee, wrist, and elbow are most commonly sprained.

Treatment: Apply a snug (not tight) bandage, preferably an elastic bandage. Elevate the part. Cover with an ice bag or towels wrung out of ice water. Leave the cold applications on for 1 or 2 hours. Leave the gentle compression bandage on for 24 hours. From the second day onward hot soaks are indicated, and after 48 hours these may be followed by light massage, rubbing around the swollen part gently and towards the heart. A sprained joint should be rested until the pain has disappeared, and until tenderness and swelling have lessened. Active use of the joint should be resumed early but gradually, and during this period a supportive bandage should be applied.

A dislocation is an injury to a joint, characterized by a displacement of the head of the bone (a slipping out of its socket).

Signs.—First there is a deformity; the joint has an unusual appearance. This is best seen by comparing the injured side with the well side. There is limited movement, pain, some shock, and usually swelling.

Treatment.—The risk of doing injury by injudicious efforts to replace a dislocated bone is greater than that of delaying until the services of a medical officer can be obtained. Place the injured member in the position most comfortable for the person and cover the part with cold, wet cloths while waiting for the doctor.

Special dislocations.—Dislocation of the lower jaw and of fingers may be treated cautiously by anyone who has some knowledge of first aid.

A dislocated jaw, with the mouth very wide open in consequence, is most painful and uncomfortable. The person is unable to close the mouth. To reduce this dislocation, wrap both your thumbs with several layers of cloth, so that they will not be bitten. Then place both thumbs in the persons's mouth on the lower teeth, one on each side, while the fingers grasp the outside of the lower jaw. Pressure is then made downward and backward. As the jaw starts to slide into place let the thumbs slip off the teeth to the inside of the cheeks. If this is not done they will

be caught by the teeth as the jawbone goes into place. After reduction apply a jaw bandage.

Dislocations of the fingers are easily reduced. Grasp the finger on the palm side and hold firmly while with the other hand pull the end of the finger straight out. The bone will ordinarily slip easily into place. No dressing is required.

A fracture is a broken bone.

Causes.—Direct violence, in which the bone is broken where struck; indirect violence, in which the bone is broken at some distance from the point which received the blow, such as a broken collar bone, following a fall upon the outstretched hand; muscular action, breaking a bone by a sudden and violent muscular contraction, as in the case of kneecap in jumping.

Signs of fracture.—There are pain, swelling, and deformity at the seat of injury; unnatural mobility, loss of power, and usually shortening of the limb; crepitus, which is a sensation of grating to be felt when the broken ends of the bones move against each other.

Varieties.—There are two general classes of fractures, simple and compound.

(1) Simple fractures are those which are beneath the unbroken skin.

(2) Compound fractures are those in which an external wound, communicating with the break, exists.

Treatment.—In the immediate treatment the following points should be attended to:

(1) The prevention of further injury and the preparation of the person for transport. To prevent further injury, attend to the person on the spot where the injury occurred, especially if the fracture happens to be in the lower extremity. Do not unnecessarily handle the limb until you have all splints and bandages ready. By rough handling a simple fracture may be converted into a compound or complicated one, especially where the bones are immediately under the skin, such as the collar bone and the shin bone.

(2) Without removing the clothes, unless the fracture is compound or there is a hemorrhage, bring the bones into their relative positions as follows: Lift the limb by grasping it gently but firmly above and below the seat of fracture; then pull gently in the normal line of the bone. This should cause little or no pain. Fix the limb in this position by means of splints and bandages.

Splints are more or less rigid supports used to immobilize joints and fractured bones. Many articles in daily use, and others that can be found

in the field, can be used to keep the injured parts in place. For instance, broomsticks, newspapers, wine-bottle covers, stockings filled with straw or sand, pieces of wood and laths can be employed. In the field we may make use of the branches of trees, pieces of bark, shrubs, rifles, and bayonets. The opposite leg can be used for a splint for the injured one (Fig. 28-7), and in the case of the upper extremity it can be splinted against the chest by snugly binding it there with bandages.

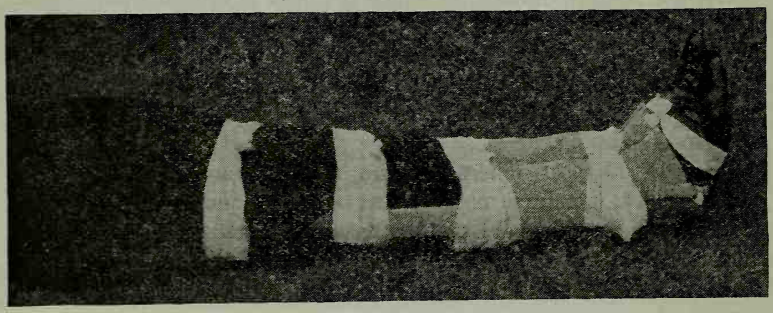


FIG. 28-7—Opposite leg used as a splint for injured one.

Improvised splints.—These splints should always be constructed of material which is sufficiently stiff to keep the parts in position; they should be made long enough to extend some distance beyond the joint above and below the fracture if possible. They should be as wide as the limb to which they are to be applied. Before applying splints, pad them

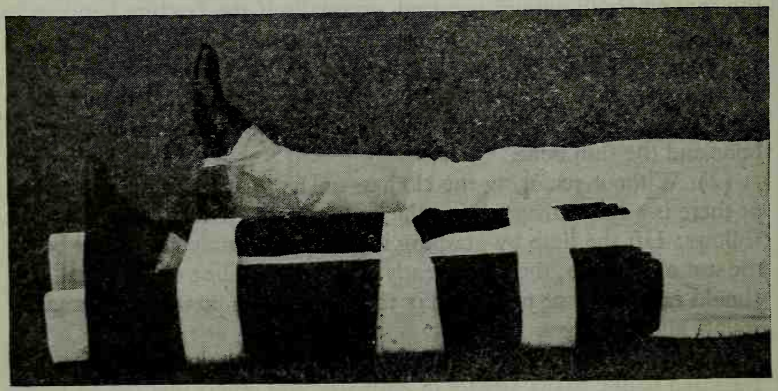


FIG. 28-8—Improvised splints of sticks with blanket material for padding.

well on the side next to the limb (unless the clothing is allowed to remain on) with some soft material, such as towels, cotton, wool, oakum, straw, flannel, folded triangular bandages, etc., and make the padding extend well over on each side of the splint (Fig. 28-7).

To apply splints.—Two persons are required. One takes traction and gently lifts the injured part while pulling steadily in the line of the injured bone. This can sometimes be done with one hand. In that case the other hand should be put under the seat of fracture to support it. The second person applies the splints, one on each side of the limb, and fixes them in position by tying about them above and below the line of fracture with triangular bandages folded narrow, or straps, belts, suspenders, tapes, or rubber adhesive plaster. All knots should be tied over the outer splint and not over the bone. The general rule that injured parts should be elevated holds good in the case of fractures. The splints should not be applied so tightly as to impede circulation. If splinted limbs are allowed to hang down, swelling follows, and the circulation may be dangerously cut off.

Immediate treatment of compound fracture.—Expose the wound and treat as directed above. Then apply splints. The principal danger in these cases is infection. The commonest source of bacteria or germs is the skin of the fingers or the skin about the wound. Do not touch the wound with unclean fingers unless necessary to stop bleeding to save life.

Transportation.—As a rule, persons with broken bones should not be removed until the bones have been splinted. Faintness is apt to come on after a fracture, but usually persons suffering from fractures of the upper extremity can walk with assistance. Those suffering with fractures of the lower extremity should be carried on stretcher.

Injured person's care of himself.—Should the patient believe he has sustained a fracture, he should lie down carefully and try to place the broken bone in its proper position, which will be found to be the most comfortable one. Under no circumstances should he attempt to walk if a lower extremity has been injured, as in this way a simple fracture might be made compound, or the bone ends might be made to tear into a large blood vessel.

Special fractures.—(1) Fracture of the skull.—This injury is very serious and should be treated by a medical officer as early as possible. Wound infection should be prevented by applying a first-aid dressing if necessary.

(2) Fracture of the jaw.—Tie a triangular bandage or other cloth support under the chin and over the top of the head.

(3) Fracture of the ribs.—Pass a wide band (or several narrow

bands) of rubber adhesive plaster two-thirds around the chest while arms are held over the head and the chest is emptied of air, or snugly apply wide bandages.

(4) Fracture of the collar bone.—Rest the arm on the injured side in a sling and secure this arm to the chest by pinning the sleeve to the jumper or by passing a bandage over and around the chest (Fig. 28-9).

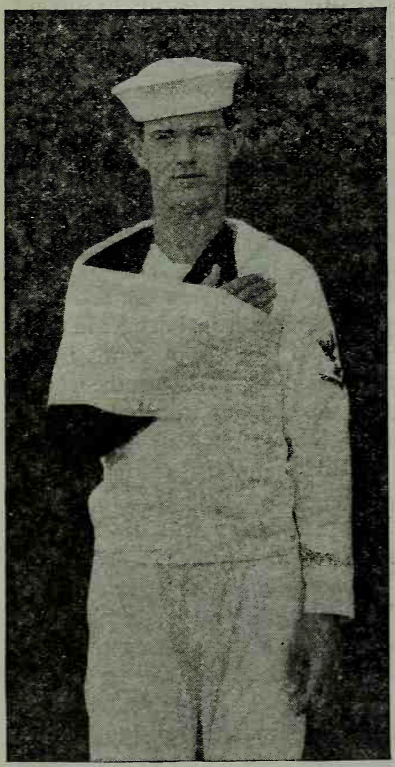


FIG. 28-9—First-aid treatment for fracture of collar bone.

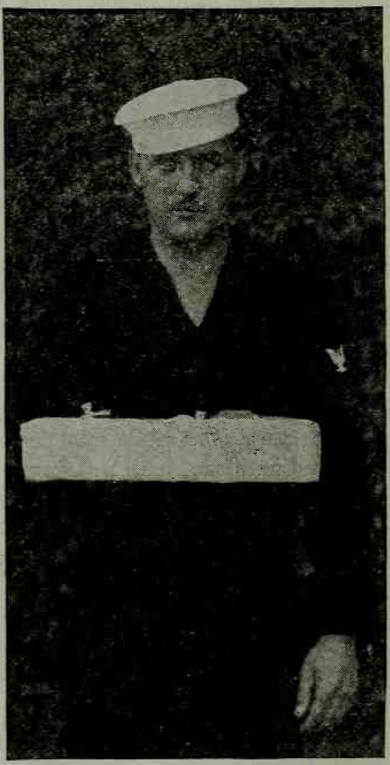


FIG. 28-10—Dressing for fracture of forearm.

(5) Fractures of the arm and forearm.—The proper method of dressing a fracture of the forearm is shown in Fig. 28-10. The part should

be carried in a wide sling. Figure 28-11 shows the proper method of dressing a broken upper arm. It will be noticed that the sling does not support the elbow.

(6) Fracture of the leg.—An ordinary pillow tied about a broken leg makes an excellent splint. (See Fig. 28-12.)

(7) Fracture of the thigh.—(*a*) A broken thigh is the most difficult bone in the body to splint properly. The splint on the outside should extend from the armpit beyond the sole of the foot and that on the inside from the crotch to the sole of the foot.

FIG. 28-11—Dressing and sling for fracture of upper arm.

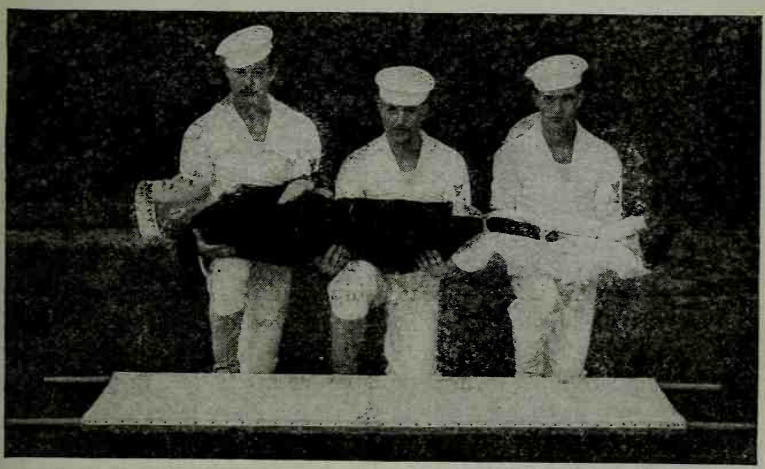


FIG. 28-12—Pillow splint for fractured leg. Note method of placing on stretcher.

(*b*) In the field a rifle may be used instead of the long outside splint. The butt is placed in the armpit, the trigger guard to the front. It

should be secured at the points shown in Fig. 28-13. The feet should be tied together, also the legs below the knee. This prevents the foot on the injured side from turning out.

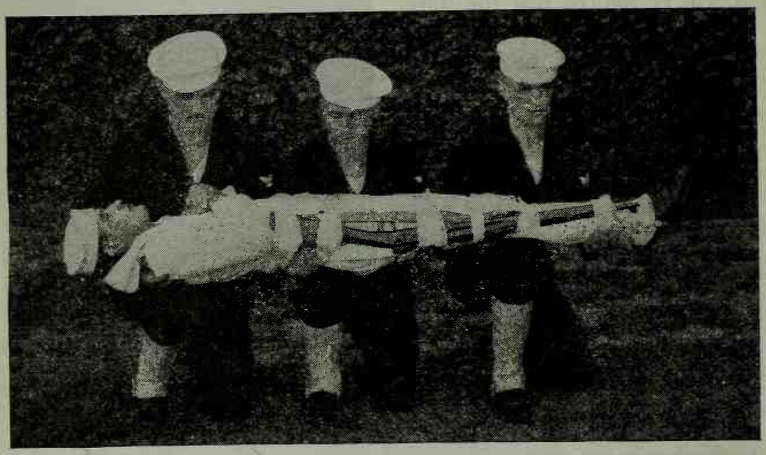


FIG. 28-13—Rifle used as splint for fracture of thigh.

METHODS OF CARRYING THE WOUNDED

In preparation of the wounded for transportation, the first-aid dressings should be applied and broken bones should be made immovable by means of splints. The following discussion will cover and illustrate the methods of carrying the wounded with 1, 2, and 3 bearers and the proper use of regular and improvised stretchers.

Where men are injured aboard ship, it may be necessary for the man nearest to him to render first aid. At general quarters, hospital corpsmen are located at stations over the ship so as to be in position to take care of injured men as promptly as practicable. In taking care of injured men in engagements in which the Navy takes part through landing forces, etc., it may frequently happen that only one man is available to aid the injured man. The first consideration is to render whatever first aid may be possible under the circumstances. However, it may be that the injured man is in a place so exposed that it is highly important to get him to some sort of shelter.

Where only one man is available to carry the injured.—In a situation where only one man is available to carry the injured man to

shelter or to an emergency dressing station, the best method of carrying the injured man will depend upon the nature and seriousness of his injury, the nature of the field or place, the battle situation, etc. Because of these factors, the particular method of carrying the man must be left to the best judgment of the man who is to carry him.

(1) *In-arms carry*—If the general situation permits your carrying

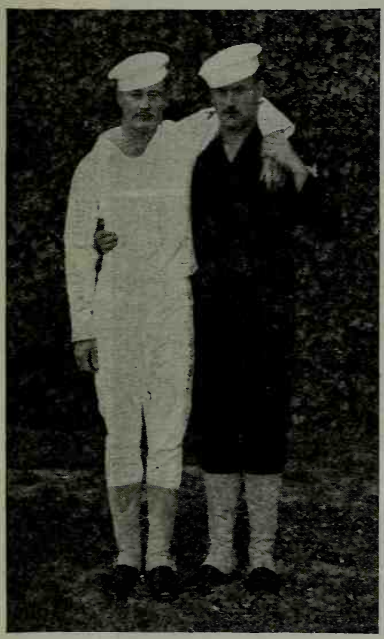


FIG. 28-14—In-arms carry. Completion of first step.

FIG. 28-15—In-arms carry. Final step.

the injured man in your arms, the accepted method is as follows: Turn the injured man over on his face, step astride his body, facing toward his head. With your hands under his armpits, lift him to his knees; then clasp your hands under his stomach (abdomen) and lift him to his feet. With your left hand, clasp the injured man's left wrist and draw his left arm around your neck, holding it against your left chest; with the injured man's left side resting against your body, support him with your right arm around his waist. This completes the first step. (See Fig. 28-14.)

FIG. 28-16—Across-back carry. Completion of first step.

Fig. 28-17—Across-back carry. Completion of second step.

FIG. 28-18—Across-back carry. Final step.

From this position, with your right arm around the injured man's back, pass your left arm under his thighs, and lift him into position, carrying him well up. (See Fig. 28-15.)

(2) *Across-back carry.*—The method of getting the injured man upon your back in the proper manner is as follows: Lift the wounded man erect, or as nearly so as practicable, as in *In-arms carry.* Seize his right wrist with your left hand and draw his right arm over your head and down upon your left shoulder, leaving your right hand free. (See Fig. 28-16.) Then shift yourself in front of the man, stoop, sustaining part of his weight upon your shoulders and back, thrust your right hand and arm between his legs, clasping his right thigh with your right arm. Shift his right wrist to your right hand. Now grasp his left hand with your left hand. (See Fig. 28-17.) As you stand up, steady his left hand against your side. (See Fig. 28-18.)

(3) *Modified across-back carry.*—Immediately following are given directions for getting a man into the proper position for carrying from either his right or left side. The description reads from point of view of the bearer who has taken position on the man's left side.

Lay the injured man out upon his back. Kneel at his left side, and flex (bend) his left leg at a right angle to his body and under his right leg. (See Fig. 28-19.)

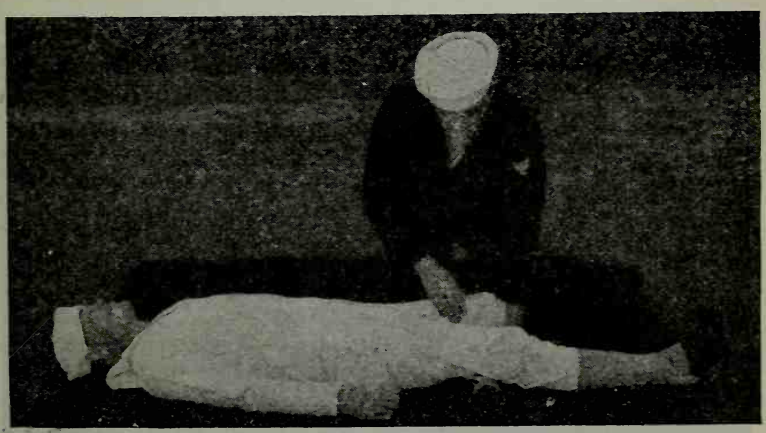


FIG. 28-19—Modified across-back carry. First step.

Place your right arm under his right leg, behind the knee. (See Fig. 28-20.)

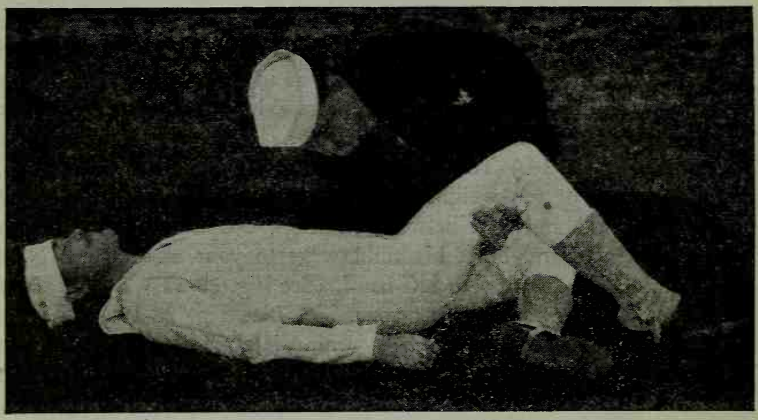


FIG. 28-20—Modified across-back carry. Second step.

With your left hand grasp the right wrist of the man and draw his right arm over your head, placing your head and neck snugly under his

FIG. 28-21—Modified across-back carry. Third step.

right armpit. Shift the man's right wrist to your right hand, grasping his right wrist firmly with your right hand; next place your own left hand, palm down, on the right foot of the man. (See Fig. 28-21.) Then partly rise and at the same time exert pressure on the man's right foot or leg, holding the foot against the ground. (See Figs. 28-22 and 28-23.) As

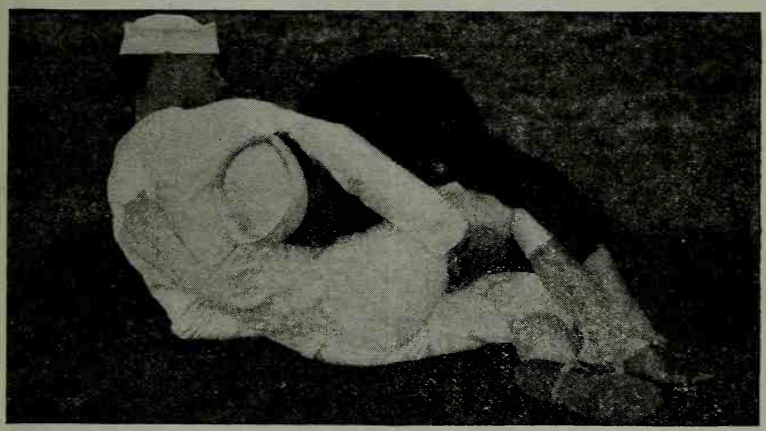


FIG. 28-22—Modified across-back carry. Fourth step.

soon as you have gained your balance, assume an erect position and grasp the man's free hand with your own, bringing it to your side. (See Fig. 28-24.)

(4) *Another modification of the across-back carry.*—It may happen that on account of the stature or weight of the man to be carried, the bearer will find it impossible to get him upon the back in the way indicated above, or the condition of the man may preclude getting him upon your back in the manner previously described. In such a case the method described below may prove a better way of getting the man in position to carry him.

Place the man to be carried on the ground upon his back. Lie down beside him on your back at his left side, with your hips about even with his shoulders, your head toward the injured man's feet and overlying about one-fourth of the man's trunk (body). Then reach across his abdomen, grasp his right arm above the elbow from its under (posterior) side with your own right hand, and with your left grasp the man's right arm below the elbow from the front side. (See Fig. 28-25.) Then turn

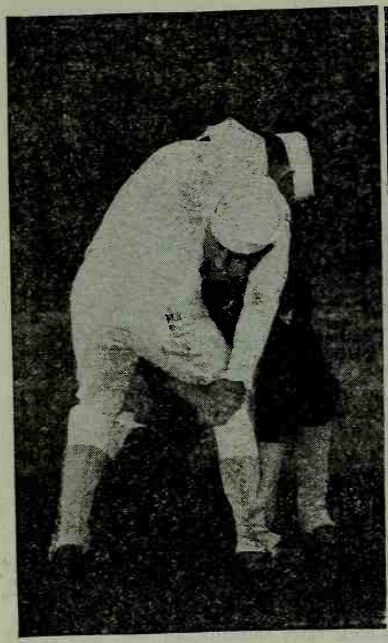


FIG. 28-23—Modified across-back carry. Fifth step.

FIG. 28-24—Modified across-back carry. Final step.

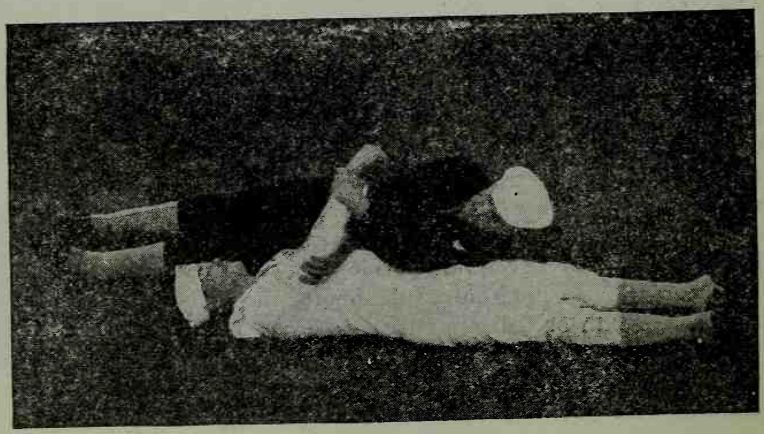


FIG. 28-25—Another modification of across-back carry. First step.

over away from the man, pulling him with you by his right arm. At the completion of this movement the man should be lying upon his chest on your back at a right angle, with his arm over your left shoulder. (See Fig. 28-26.)

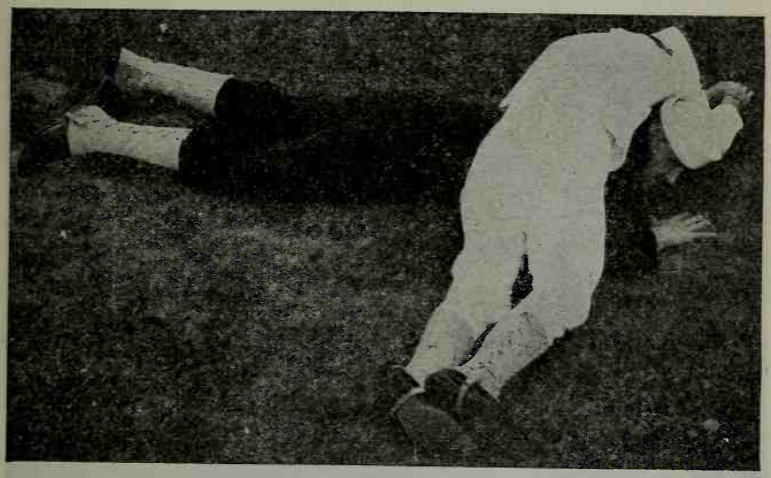


FIG. 28-26—Another modification of across-back carry. Second step.

Holding the man's arm, move slightly toward his pelvis (hips) with your right hip and shoulder. Place your right arm between the man's legs. Draw his right leg to you. Place his right wrist in your right hand. (See Fig. 28-27.)

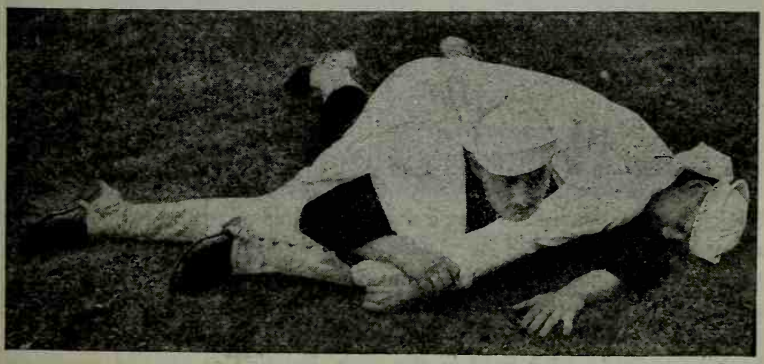


FIG. 28-27—Another modification of across-back carry. Third step.

Rise to an erect position by helping yourself with your left hand on the ground and obtaining a purchase on the ground with your right foot. It is believed that this method has certain advantages in getting badly injured or unconscious men upon one's back. (See Fig. 28-28.)

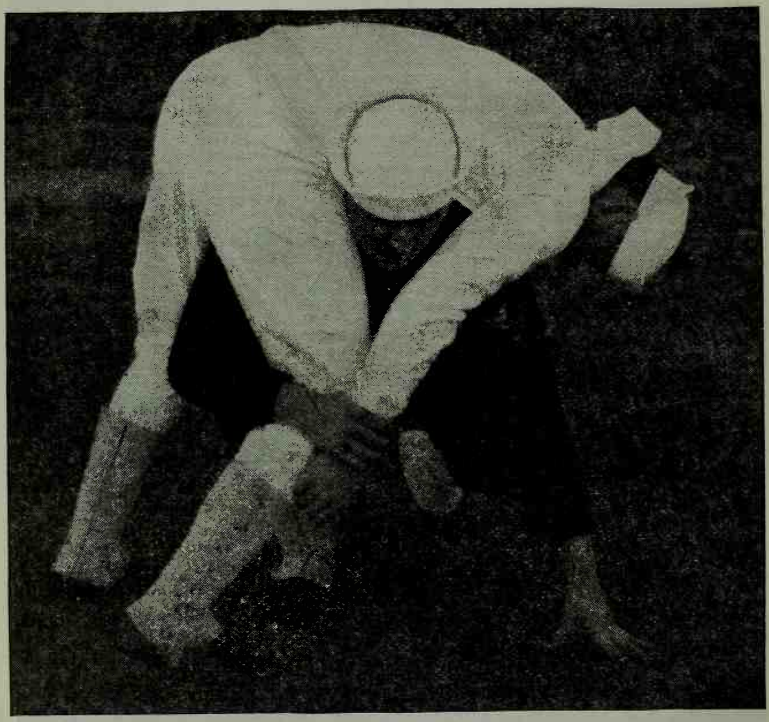


FIG. 28-28—Another modification of across-back carry. Fourth step.

(5) *Tied-hands crawl or carry.*—The condition of the field or battle situation may render it impossible to attempt to take a man to the rear or to a dressing station by any of the previously mentioned methods. But it may be possible to take a man to shelter or to the rear, crawling along with him secured over your back, and thus partly avoid open view, machine-gun fire, snipers, etc. In such a situation the following method, known as the *tied-hands crawl or carry,* may prove valuable.

Lay the man to be carried on his back and place yourself upon your back by his side, your head in the same direction as his and overlying

about one-quarter of his body. Grasp his right arm above the elbow from its lower (posterior) side with your right hand. With your left hand grasp his same arm below the elbow, from the top (anterior) side. (See Fig. 28-29.) Then, keeping the right side of your body slightly

FIG. 28-29—Tied-hands crawl. First step.

upon the man's body and entwining your limbs (legs) around his own, roll over onto your chest (stomach), pulling the man with you. The man is now lying face down on your back, with one arm over your shoulder. (See Fig. 28-30.) Next grasp his free arm and draw it to you. Place your

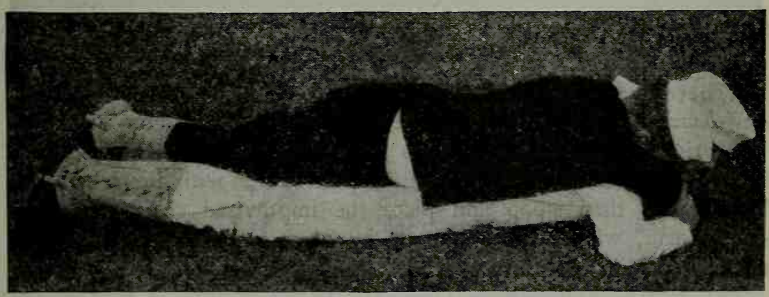


FIG. 28-30—Tied-hands crawl. Second step.

own arm on top, so that the man's arm is under your left armpit. Secure both wrists of the man with any available material (neckerchief, handkerchief, etc.) You may then crawl with the man in this position, or, when necessary, rise erect and climb ladders, or reach behind and carry

the man (pack on back) by seizing each leg and bending it at the hip. This method may be varied by tying the man's wrists together first and then lying on top of him and inserting your head and shoulders through the loop formed by the man's tied wrists. (See Fig. 28-31.)

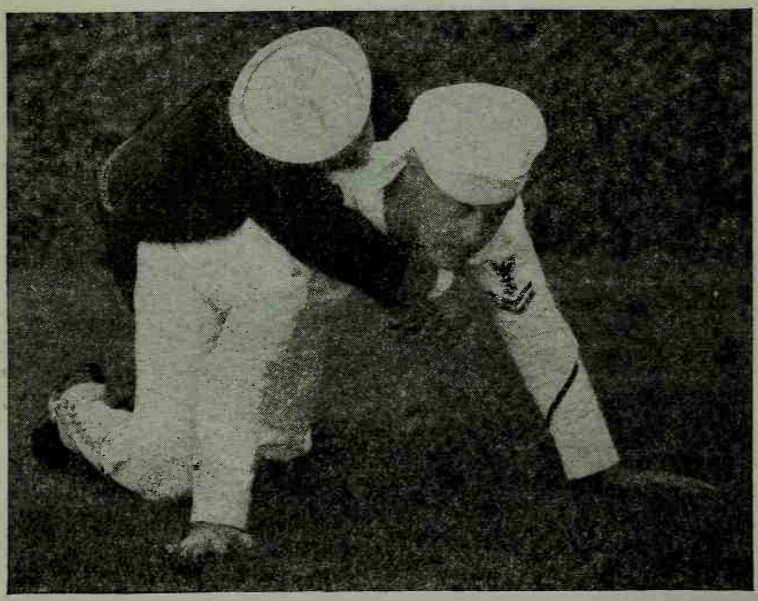


FIG. 28-31—Tied-hands crawl. Final step.

Where two men are available to carry the injured.—(1) *"Chair" or 4-handed carry.*—In this method of carry each bearer grasps his own left wrist in his right hand, with the backs of the hands uppermost, then grasps the right wrist of the other bearer with his left hand. The bearers then stoop and place the improvised chair under the sitting man, who steadies himself by placing his arms about their necks. (See Fig. 28-32.)

(2) *By the extremities.*—One man takes position at the injured man's head and the other man takes position between the injured man's legs, both facing toward the wounded man's feet. The man at the head of the injured man clasps him from behind around the body under the arms and raises him to a sitting position. At the same time the man between the man's legs passes his hands from the outside under the flexed knees. At the word, both rise together.

FIG. 28-32 —"Chair" or 4-hand carry.

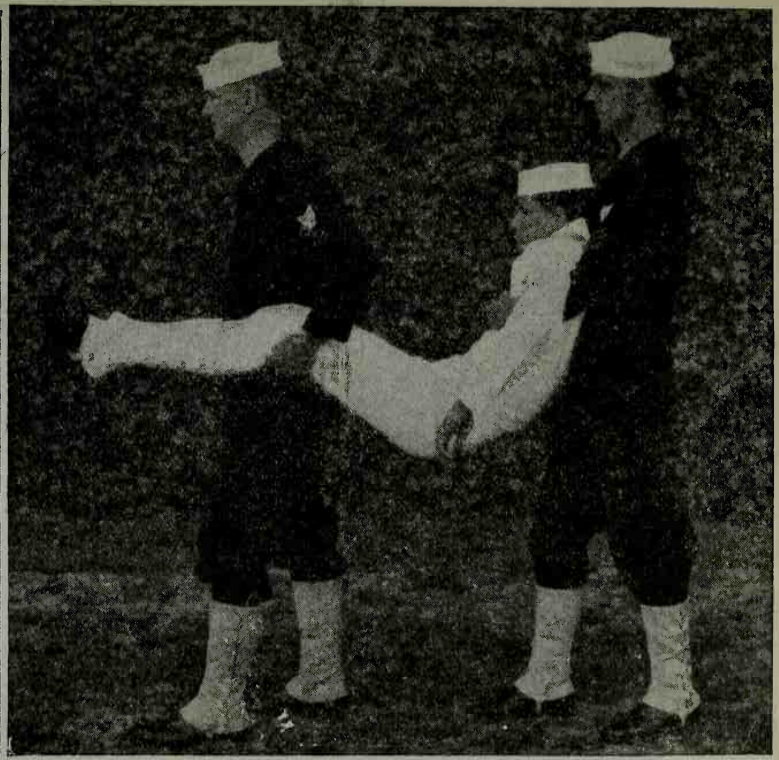


FIG. 28-33—By the extremities.

This method requires no effort on the part of the injured man, but is not a good carry in cases of severe injury to the extremities (legs, arms, etc.). (See Fig. 28-33.)

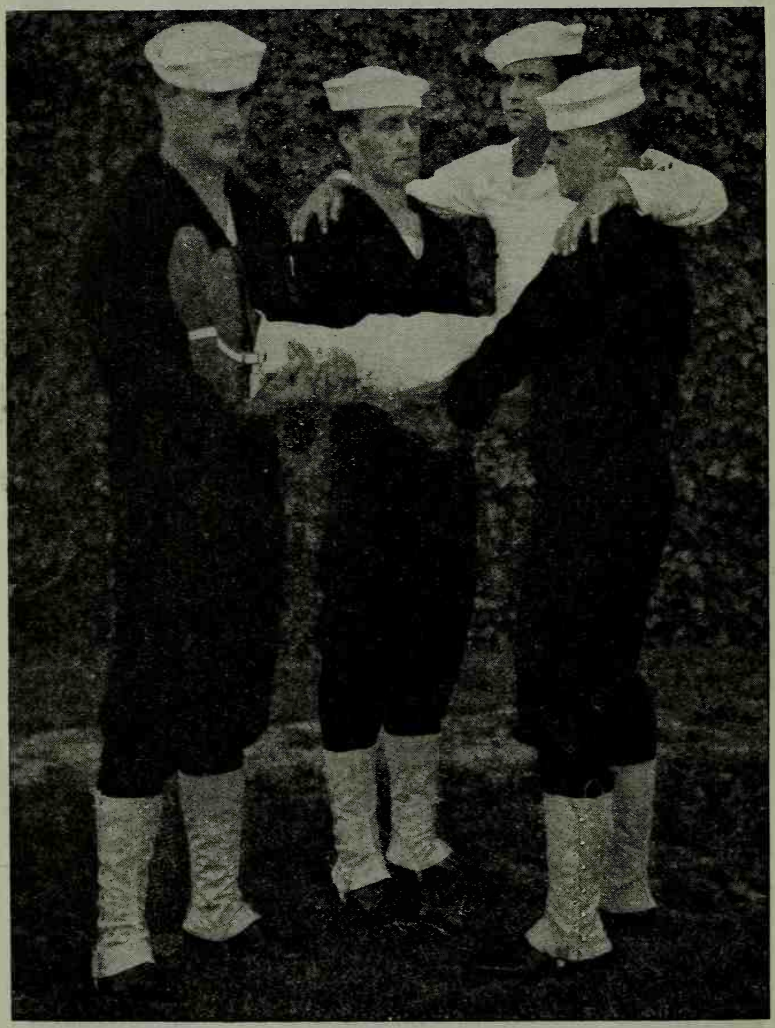


FIG. 28-34—Three-man carry.

Where three men are available, the carry indicated in Fig. 28-34 is possible.

Every man should practice the one-man carry methods for transporting injured men until he is able to use any of them readily, for the good and sufficient reason that such knowledge may be the means of his saving the life of a shipmate instead of leaving him helpless upon the field.

USE OF REGULAR AND IMPROVISED STRETCHERS

General directions for handling a stretcher.—The method of placing a wounded man on a stretcher is shown in Fig. 28-35. The posi-

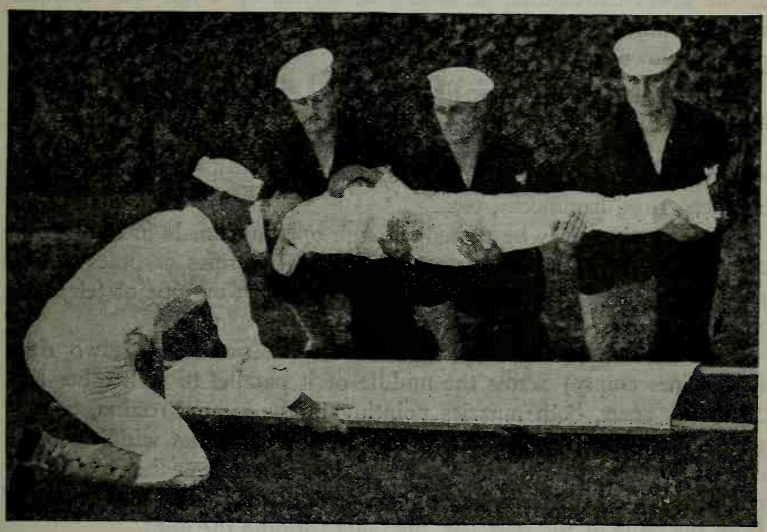


FIG. 28-35—Placing wounded man on stretcher.

tion of a patient on a stretcher depends upon the character of the injury. An overcoat, blanket, knapsack, or other suitable article may be used as a pillow. If the patient is faint, the head should be kept low. Difficulty in breathing due to wounds of the chest is sometimes relieved by judicious elevation of the shoulders. In wounds of the abdomen, the best position is on the injured side, or on the back if the front of the

abdomen is injured, the legs being drawn up and supported in this position.

In injuries of the upper extremity, the best position is on the back with the arms across the body or suitably placed by its side. In injuries of the lower extremity, the patient should be on his back, or inclining toward the wounded side. Patients should be handled deliberately and as gently as possible, having special care not to jar the injured part. Bearers should not keep step. The handles of the stretcher should be carried at arms' length. Bearers should keep the stretcher level, notwithstanding any unevenness of the ground. As a rule, the patient should be carried on a stretcher feet foremost, but in going up a hill his head should be in front. In the case of fracture of the lower extremities, he should be carried up a hill feet foremost and downhill head foremost, to prevent the weight of the body from pressing down on the injured part.

Improvised stretcher.—An improvised stretcher should always be tested before placing a patient on it.

Among the articles that may be employed as stretchers are boards, window shutters, doors, bed frames, mattresses, benches, tables, chairs, blankets, rugs, hammocks, etc.

Rifles or poles may be passed through openings made in the bottom of sacks or coats, or trousers may be used. The rifles or poles can be prevented from spreading too far apart by a turn of rope or telegraph wire.

Rifle stretcher.—Spread a blanket on the ground, lay two rifles (magazines empty) across the middle of it parallel to each other and 20 inches apart, both muzzles pointing in the same direction, trigger guards outward. Turn a fold of the blanket 6 inches wide over the end of the butt, fold the right side of the blanket over the rifle on the opposite side, then, similarly, fold the left side. These folds of blankets form the body of the stretcher, the butts forming the head.

Pole and blanket stretcher.—Place two poles longitudinally along the edge of the blanket and roll the sides of the blanket snugly over the poles until they are 20 inches apart. The blankets can then be tied to the poles, and sticks of wood can be placed between the poles at each end to act as spreaders.

Pole and rope stretcher.—Place two poles 20 inches apart and securely lace back and forth a suitable piece of rope; this rope forms the body of the stretcher.

OTHER INJURIES

A burn is the local effect of heat such as flame, hot metal, electric current, etc.

Scalds are due to moist heat such as hot water or steam.

There are three degrees of burns: First degree, a mere reddening of the skin; second degree, the formation of blisters (these two degrees of burns are not followed by scarring); third degree, charring and destruction of the tissues; both layers of the skin are burned and scarring always follows. These injuries are often of extreme gravity.

Considerable shock may accompany burns, the severity of the shock depending on the extent of the body surface involved. Shock is evidenced by a cool moist skin, shallow respiration, and weak pulse.

Treatment.—Remove clothing from the part with the utmost care to avoid breaking blisters. It may be necessary to cut away the clothing, and if the clothing sticks to the burned surface it should be left attached at those points. Only one part should be dressed at a time. In first and second degree burns cover the burned surface with cloths or pieces of lint soaked in a saturated solution of boric acid or baking soda. A water solution of tannic acid freshly prepared (5%), or tannic acid jelly, furnished to the Navy in tubes, is the best treatment. This relieves the pain and forms a protective dressing. Do not use an ointment or oily preparation because these interfere with treatment with tannic acid. Also never apply strong antiseptics or powders.

Extinguishing burning clothing.—If your own clothing catches fire, do not run, as this but fans the flames. Lie down and roll up tightly in a coat, blanket, or anything at hand that will smother the flames, leaving only the head out. If there is nothing at hand with which to wrap up, lie down and roll over slowly beating out the fire with the hands at the same time.

If another person's clothing catches afire, throw him down and smother the fire with a coat, blanket, or anything at hand. In doing this stand at the head and, holding down with one foot the blanket or whatever is used, throw it toward the feet of the person, thus sweeping the flames away from yourself and the face of the burning person. It is well to bear in mind that the air close to the deck is comparatively free from smoke. Hence, when unable to breathe, a rescuer should crawl along with head low, dragging anyone who has been rescued behind him. A wet handkerchief or cloth tied over the mouth and nostrils minimizes the danger of suffocation.

Burns by acids.—Flush the parts with water, then apply baking or washing soda and water, limewater, or soapsuds. This neutralizes any acid remaining, and after this the burn may be treated as other burns. Burns from carbolic acid (phenol) should be washed with alcohol, if obtainable.

Burns by alkalies.—The parts should first be washed with water, then neutralized with diluted vinegar or lemon juice, and finally treated as for an ordinary burn.

Sunburn should be treated in the same manner as other burns. Limewater, with the addition of two drops of liquid carbolic acid to the ounce, is a very soothing application.

Heat exhaustion.—(1) *Heat cramps* are painful muscular spasms, usually of the belly wall, legs, and arms, caused by exposure to excessive heat, usually while working hard and sweating. This is the mildest form of generalized heat injury. The treatment is that of heat exhaustion.

(2) *Heatstroke* (or sunstroke) is due to prolonged exposure to excessive heat, usually the heat of the sun. It is especially apt to occur to men on the march in close formation. Frequently there are premonitory symptoms such as headache, dizziness, frequent desire to urinate, and seeing things red or purplish. When the stroke comes the man falls unconscious; his skin is intensely hot and dry; pupils contracted, pulse full and strong; breathing noisy; may be convulsions. This condition must be promptly relieved or death will ensue. The object of treatment is to reduce the body temperature. The affected individual should be carried at once to the coolest available shady spot. His clothing should be removed, an ice bag placed on the head, and cold water poured continually over the body. The body may be rubbed with ice, or immersed in a tub of ice water or stream of cold water if available. These methods should be continued until the temperature is reduced, but should not be persisted in after it appears the temperature is approaching a normal level. When able to swallow, he should be given cold (not iced) water to drink; or better, cold water to which salt has been added (½ teaspoonful to the glass). Fluids should be offered as freely as they can be taken.

(3) *Heat exhaustion,* also caused by exposure to excessive temperatures, presents an entirely different picture. The onset is often with nausea, vomiting and stomach-ache. Suddenly the man drops. His face is pale, cool and moist, his temperature below normal. The pulse is weak; breathing is shallow and maybe sighing. Consciousness is re-

tained, he is easily aroused, but prefers not to be disturbed. Violent cramps of certain muscle groups may co-exist. These cramps may be relieved by hot compresses or by immersing the affected part in a warm bath. The general treatment for heat exhaustion includes loosening tight clothing, rest in a shady spot with the head low and protection from drafts or chilling by covering with a warm blanket. Warm drinks containing salt should be given as freely as acceptable, i.e., hot soup or hot coffee, with ½ teaspoonful of salt to the large cup.

The prevention of general heat injury is most important. It has been found that these conditions are largely due to the loss of salt from the body in sweating. Persons working in hot places should replace this loss by eating more table salt, by addition of salt to the drinking water, or by swallowing Navy Salt Tablets (as issued to the engineers' force), one with each glass of water.

Frostbite.—This is due to the local effect of cold on the exposed parts of the body. Usually the toes, fingers, ears, or nose are involved. The affected part has been extremely cold; then it becomes insensitive and has a white or grayish color.

Treatment.—The object in treating frostbite is to restore slowly and gradually the circulation of the blood and warmth in the part affected. If the case is mild and some reaction from the extreme cold has begun, rub the part lightly and apply cloths wrung out in cool or tepid water. If the part is still dead and cold, combine the rubbing with the use of wet snow or ice water and, as circulation begins to return, use water not so cold. The rubbing must not be too energetic as any roughness or bruising will increase the damage. Also do not use heat at first, as the danger of sudden thawing is gangrene or death of the part. Hence while the person should not go into a warm room or near a fire, he should go or be removed to a sheltered place until circulation is restored. After the circulation is well established, then warm water may be used for bathing the affected part.

Freezing.—This condition of the body is produced by long exposure to extreme cold. The effect of the cold is increased by overexertion, hunger, insufficient clothing, and alcoholic liquors. The body and limbs first feel numb and heavy and then become stiff. This is followed by drowsiness and an irresistible desire to sleep. The depression of vitality is so great that the appearance is frequently that of a dead man.

Treatment.—The object is to restore warmth to the body gradually.

Carry the person into a cold room or a sheltered place, rub his limbs toward the body briskly with rough cloths wet in cold water. When stiffness is removed, artificial respiration should be performed if necessary. Gradually increase the temperature of the room and of the cloths used. As soon as he can swallow, give stimulants in small quantities, such as hot tea, coffee, or soup, or aromatic spirits of ammonia. A frozen person must not be taken into a warm room at once because sudden restoration of circulation frequently causes violent congestion and often sudden death through the formation of clots in the blood vessels.

Poisoning.—Certain circumstances indicate that a poison has been taken:

(1) In a person who has been in good health, sudden and severe sickness after eating, drinking, or taking medicine.

(2) Possibly the person affected may have been sick, despondent, or has talked of suicide.

(3) The presence of bottles or glasses in which some of the poison remains.

(4) Frequently the person who has taken poison becomes frightened and tells someone.

(5) If a number of persons who have eaten the same food become seriously ill after a meal, it is almost certain that they are suffering from poison, or probably food infection, called "food poisoning."

(6) In carbolic-acid poisoning there is a strong carbolic odor, and the lips, tongue, and mouth are burned white.

(7) In morphine poisoning the pupils are pin point in size, breathing is full and slow, and the person is very drowsy and later sleeps so soundly that it is almost impossible to arouse him.

(8) Alcoholic poisoning may be evidenced by a strong odor of alcohol, pupils dilated, face usually flushed. Eyeballs red but not insensitive to touch. If unconscious, the condition should be differentiated from apoplexy. An apoplectic may have been drinking and so have the odor of alcohol on his breath. His pupils are frequently unequal in size, and there is a paralysis usually on one side of the body, which may be shown by raising an arm or a leg. If paralyzed, it will drop and offer no resistance.

Treatment.—Cases of accidental or suicidal poisoning may often be saved if treated promptly. If the poisoning agent is not known, the safest procedure is to give at once, by mouth, large quantities of lukewarm water. Then a mild emetic should be administered. A tablespoon-

ful of powdered mustard or two tablespoonfuls of common table salt in a glass of warm water are both excellent emetics and may be repeated once or twice. Soapsuds may act as an emetic and in urgent cases should be tried. After copious vomiting, soothing liquids should be given, such as oil, milk, beaten-up raw eggs, or flour and water, each in moderate quantities. Then strong coffee, tea, or aromatic spirits of ammonia should be administered and the person should be kept warm with hot bottles. Rub the limbs toward the body to increase the circulation. Obtain the services of a doctor as soon as possible.

Acid poisoning.—Give alkalies, such as a tablespoonful of aromatic spirits of ammonia in a glass of water, baking soda, whitewash, tooth paste, or soap.

Alkali poisoning.—Vinegar can generally be obtained and is an excellent antidote. It should be given undiluted and freely, a half teacupful at a time. Lemon juice may also be used.

Unconsciousness may result from a number of different conditions, and to treat it properly you should first endeavor to determine the cause. The surroundings should be considered as well as the appearance and condition of the unconscious person.

The common causes of unconsciousness are bleeding, severe injuries, electric shock, gas poisoning, sunstroke or heatstroke, heat exhaustion, freezing, fainting, fits, apoplexy or brain injuries, and certain poisons.

Treatment.—Take immediate steps to remove the apparent cause of insensibility, e.g., stop bleeding, remove from presence of the poisonous gas, carry to shady place in case of sunstroke, or act as may be otherwise indicated. In case the body of the unconscious person is in contact with a live wire, the first thing is to set him free from the wire. Great caution should be exercised in doing this, as to touch him with the bare hands will give the rescuer the same shock. If possible, the current should be cut off immediately. If this cannot be done, contact may be broken with a piece of dry wood, or if two live wires are in contact with the person they may be short-circuited by dropping an iron bar or a metallic tool across them. The rescuer's hands should be protected with rubber gloves; if these cannot be procured, first wrap a mackintosh coat or a thick, dry, woolen-cloth coat, or other dry articles of clothing around the person, and then pull him away from the source of danger.

To treat unconsciousness, place the person on the back with the head

lowered. Loosen clothing. Hold ammonia or aromatic ammonia on a cloth under the nose. Do not try to give anything by mouth to an unconscious person. Sprinkle face and chest with cold water and rub the limbs toward the body. Keep the crowd away, so that the person can get plenty of fresh air. When able to swallow, give stimulants, coffee, tea, soup, or aromatic ammonia. Use artificial respiration if necessary. Proceed as directed in Chapter 30.

Epileptic fits.—The person, usually a young adult, falls with a cry; the face is livid and the person foams at the mouth. The foam is often blood tinged, as the tongue is usually bitten. There are usually convulsive movements, rolling the eyes, and throwing the arms and legs about.

Treatment.—Lay the person on his back and control movements which might cause injury. Place a folded towel or other convenient wedge between the teeth so that the tongue will not be bitten. The convulsion usually lasts only a few minutes, and then the person falls into a deep sleep which should not be interrupted. In the unconscious stage, evidence of an epileptic seizure may be detected by the disarranged clothing, foam at the mouth, or the bitten tongue.

Asphyxiation results from an insufficient supply of oxygen to the body. Submersion or drowning is the common cause. It may also result from exposure to air depleted of oxygen, such as in poorly ventilated or recently painted compartments, or in poorly ventilated areas where there has been a recent fire or explosion. At high altitudes, above about 15,000 feet, the oxygen supply is insufficient.

Asphyxiation also results when the respiratory apparatus ceases to act. Foreign body in the respiratory passage will cause it. Severe shocks, such as electric shock or severe blows to the body, may paralyze the nervous system temporarily. This paralysis may also result from the toxic effect of certain drugs, including alcohol.

If a man is unconscious, pay particular attention to his respiration. If it is absent, apply artificial respiration at once because after about 10 minutes of complete absence of respiration resuscitation is improbable.

Faintness, muscular weakness, and finally unconsciousness result from a deficient supply of oxygen. Unfortunately, the victim himself has little appreciation of his critical situation. In fact, just before he becomes unconscious he will act very sluggish and erratic but his own impression is that he is performing perfectly.

Removal of foreign bodies.—Foreign bodies in the eye usually

lodge on the inner surface of the upper lid. If on the eyeball or on the lower lid, they may be removed with the end of a toothpick or match wrapped with cotton, or a clean bit of cloth, or with the corner of a clean handkerchief. If on the inner surface of the upper lid, the lid should be turned back in order to detect the foreign body. To do this, tell the patient to look down, press a match, pencil, or the edge of a finger across the upper lid, half an inch above its edge; at the same time take hold of the lashes and turn the lid up. (Figs. 28-36 and 28-37.) If available, a few drops of boric-acid solution will relieve irritation.

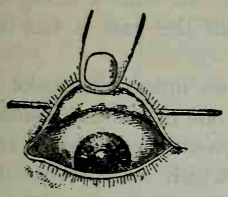


FIG. 28-36

If the foreign body is embedded in the eye, a doctor's services should be obtained promptly.

If the foreign body cannot be removed or when there is other injury to the eye, it should be covered with a dressing soaked in cold boric-acid solution or cold water to prevent further injury which might result from rubbing or movement of the lids.

Lime or lye should be washed out with boric-acid solution or clean water, and then the eye should be washed with a solution of vinegar, one teaspoon to a cup of warm water, followed by castor oil or sweet oil.

Acid in the eye should be washed out with boric-acid solution, clean water, or with lime-water followed by castor oil or sweet oil.

FIG. 28-37—Method of turning up upper lid.

Foreign bodies in the ear, including insects, are best removed by gentle syringing with warm water (if a syringe is available) or by pouring water into the ear. Toothpicks, matches, etc., should not be used, as serious injury to the ear may result. If the foreign body is not easily

removed, summon a doctor. Water should not be used to remove objects which might swell in the ear.

The stings and bites of poisonous spiders, tarantulas, scorpions, centipedes, and snakes often make their victims very ill, but rarely are any of them fatal. Circulation should be cut off with a string or tourniquet, and the wound strongly sucked until the part is free of poison; then apply cold, wet applications.

In every case of snake bite proceed as follows unless the snake is known to be a harmless type: If the bite is on one of the extremities, the limb should be immediately encircled between the wound and the heart with a tourniquet; anything will do which will prevent the poison from reaching the body—a string, a handkerchief or bandage, a belt, or a piece of cloth torn from the clothing. If a knife, is available, make several crisscross cuts through the bite and then suck the wound thoroughly, spitting out the blood and poison from time to time. After about a half hour the tourniquet should be slightly loosened, so that the circulation in the limb may be re-established. This will let some of the poison into the circulation and the tourniquet should be tightened again at once. Watch the patient for serious depression and weakness. This operation may be repeated in a few moments, if there are no ill effects. Give aromatic spirits of ammonia, beef extract, coffee, or tea to stimulate the patient. Do *not* give alcohol or treat wound with permanganate.

Ivy or sumac poisoning is quite common. It is a local irritation and inflammation of the skin caused by contact with the leaves of the poisonous plant. Within a few hours there is a reddening and itching of the skin, which becomes inflamed and swollen, blisters and even pustules often developing.

Treatment.—First scrub the part coming into contact with the ivy or sumac with soap and water to remove the poison. If available, a 4 per cent solution of ferric chloride in equal parts of glycerine and water is an excellent wash and should be applied to all exposed surfaces. A solution of ferrous sulphate in water is just as effective. This treatment is a preventive measure if used before going in woods where poison ivy or oak grows.

After the skin inflammation has developed, the parts should be washed each day with limewater or boric-acid solution and then zinc-oxide ointment, carbolized vaseline, or a solution of epsom salts applied.

Gas casualties.—The first-aid treatment of these cases depends upon the type of gas encountered. The gas officer will furnish this information after a gas attack starts. Remove patients from gas area as soon as possible. Keep masks in position until out of gas zone.

Tear gases.—To relieve irritation resulting from tear gases, wash out the eyes with boric-acid solution or weak baking-soda solution or lime-water. *Do not bandage the eyes.*

Lung irritants.—First-aid treatment for gases of this type consists of loosening the clothing and making the patients lie down and remain quiet. If moved, they should be considered stretcher cases and must not be allowed to exert themselves.

Vesicants (blistering gases).—All men who have been exposed should be given a complete bath and a change of clothing as soon as conditions permit. Wash the eyes with boric-acid solution and apply weak sodium-bicarbonate solution (baking soda) to affected parts. Rest and body warmth should be maintained.

CHAPTER 29

L—PAINTING AND THE PREPARATION OF SURFACES THEREFOR

Paints in general 286
Application of paint 287
Bottom paints 289
Brushes and how to care for them 290
Preparation of surfaces to be painted 291
A few don'ts 292
Poisonous effect produced by paints 292

PAINTS IN GENERAL

Object of painting.—Paints and varnishes are used to protect and decorate surfaces. The protection of metal surfaces is the chief object of much of the painting done on warships. How important this protection is may be seen on the rusted, scaling sides and fixtures of any ship on which the painting has been neglected or poorly done, even for a short time.

Keeping a warship in first-class condition means a constant battle against rust, and the only effective protection against rust is good paint properly applied to metal surfaces that have been carefully prepared for painting. Often in scrapping naval ships that have seen many years of service in all parts of the world, the surfaces of plates and fittings have been found to be in almost perfect condition. This shows how effectively steel and iron can be protected when the right kind of painting is done.

Composition of paints.—A paint consists of two elements called the *pigment* and the *vehicle.*

The *pigment* consists of fine solid particles of matter, substantially insoluble in the vehicle, which form an opaque colored covering on the painted surface. The pigments used in paint manufacture may be divided into white bases, extenders, natural earth colors, chemical colors, and lakes.

Vehicles may be divided into drying oils, semi-drying oils, varnishes, thinners, and driers. During the drying of a paint, most of the vehicle evaporates and the remainder of the vehicle changes from a liquid to a solid which, with the pigment, forms the protective coating on the surface. Linseed oil is used in the vehicle of many Navy paints. Soy

bean, china wood (tung) oil, and Perilla oil are sometimes used instead of linseed oil.

Turpentine, petroleum, and coal-tar distillate are the usual thinners used. Driers, which are mixtures of certain chemicals, are added to a paint to hasten its drying.

APPLICATION OF PAINT

As most painting on board ship is done by brush, only this method of application will be considered. The following advice will be of value if properly followed:

(1) Hold the brush by the handle and not by the stock. If the brush is held by the stock the hands become covered with paint, which may cause poisoning, especially if small cuts are exposed and lead paints are used.

(2) Hold the brush at right angles to the surface, with the ends of the bristles alone touching, and lift it clear of the surface when starting the return stroke. If the brush is held obliquely to the surface and not lifted, the painted surface will be uneven, showing laps and spots and a generally dauby appearance.

(3) Do not completely fill the brush with paint. Dip only the ends of the bristles into the paint. Do not charge the brush with paint until the preceding charge has become sufficiently exhausted.

(4) Apply the paint with long strokes parallel to the grain of the wood. When painting along smooth surfaces, draw the brush along the whole surface if convenient, so that there will be fewer breaks in the lines.

(5) Cross the work by laying off the paint over a small section with parallel strokes and then crossing the first application with parallel strokes at right angles to the first ones. A medium pressure should be applied during the crossing and a light pressure during a final laying off. All final laying off should be in the length direction of the work.

(6) When painting an overhead surface, the ceiling panels should, as far as possible, be laid off fore and aft and the beams athwartship. Where panels contain a great many pipes running parallel with the beams it would be difficult to lay off the ceiling panel fore and aft. In such cases better results will be obtained by laying off parallel with the beams.

(7) When painting vertical surfaces, bulkheads, etc., the work should be laid off vertically. In all cases each succeeding coat of paint should be laid off in the same direction.

(8) Keep the paint in the pot well mixed while the work is proceeding.

(9) Remember that paint applied in a too heavy coat will show brush marks and will give an uneven finish. Better results will be obtained by applying two coats of thin or medium body paint than one coat of heavy paint.

(10) Do not apply a succeeding coat of paint before a previous coat is sufficiently dry. A paint dries because of its contact with the air, and the drying of the first coat will be retarded if the second coat is applied too soon.

Care of paint.—After a container of paint has been opened and the paint partly used, it should be covered and kept as air-tight as possible to prevent a paint scum from forming on the surface. When scums or foreign substances become mixed in with the paint, it should, before being used, be strained through fine-mesh wire screen or cheesecloth.

Varnish.—A paint is opaque and therefore completely hides the underlying material, while a varnish is transparent or translucent (partly transparent) and protects the surface without hiding it. Varnishes are usually made by cooking resins and drying oils together in a kettle until the mixture has a certain consistency or "body." Driers and thinners are then added.

Application.—After the surface to be varnished has been thoroughly cleaned, filled, and rubbed off, the varnish is applied with a brush in the form of a uniform coat by crossing the work and allowing the varnish to flow in a smooth coating. It is essential that the surfaces be thoroughly cleaned from all dust particles, as these show plainly in the varnish.

Three days should be allowed to intervene between coats. Three coats should be applied on all new work.

For a dull finish, rub with pumice stone and water, then wash off and dry the surface with a damp chamois skin.

For a gloss finish, rub with pumice stone and raw linseed oil, wipe and rub surface with rottenstone, then clean with crude oil (8 parts), mineral spirits (1 part), finishing with cheesecloth or clean waste.

Do not apply the varnish too thick, as it will not dry underneath. The outer surface will dry first, forming a skin which will prevent the varnish underneath from drying because it cannot come into contact with the air.

BOTTOM PAINTS

The only bottom paints now used are the anticorrosive and antifouling paints as manufactured at navy yards.

Object of anticorrosive bottom paint.—To prevent the destruction of the steel plating by corrosion, a rust-preventive coating known as anticorrosive paint is applied next to the steel hull. This insulates the metals in the antifouling coating from the steel. This first coating is known as the anticorrosive coating because of the fact that it prevents the corrosion of the plating.

Object of antifouling bottom paint.—The object of applying a bottom paint is to prevent the fouling of the ship's bottom. The ingredients used in antifouling paint to prevent attachment of marine growths are oxides of copper and mercury. The antifouling paint is always applied over the anticorrosive paint film.

Preparation of surface.—As you will learn in the following section on the preparation of surfaces to be painted, all surfaces must be carefully cleaned. This statement is particularly true in the case of ship-bottom paint because of the service conditions to which these paints are subjected. Oil and grease frequently found at the water line must be cleaned off with gasoline or some other solvent of grease.

Even though all loose paint has been scraped and chipped off, the anticorrosive paint will not adhere if the oil and grease have not been removed.

Application of anticorrosive paint.—Before applying any paint, stir the contents of each bucket until the paint has reached a uniform consistency. As the paint contains heavy pigments which settle rapidly it must be frequently stirred during its application.

The anticorrosive paint dries very quickly because of the quick evaporating properties of its vehicle, and for this reason an operator must take care not to keep painting unconsciously over one spot and thereby build up a thick coating, with resultant waste of paint.

The paint should be applied with short, rapid strokes while the operator progresses steadily over the area to be painted.

Application of antifouling paint.—Four hours is generally considered a sufficient interval of time between the coats of anticorrosive and antifouling paint. As in the case of the anticorrosive, the antifouling contains heavy metallic pigments. These impart to the paint its antifouling properties and must not be allowed to settle. Stir the paint frequently. Apply the antifouling paint only over the anticorrosive paint and not over bare metal, for if this is done, pitting of the steel will surely follow.

BRUSHES AND HOW TO CARE FOR THEM

For general work on board ship the following brushes have been found to be most suitable:

Navy designation	Type of brush	Suitable for use on
B–2	Flat paint brush	Large surfaces.
C–1	Sash tool brush	Small surfaces.
D–1	Fitch brush	do.
D–3	....do	Very small surfaces.
E–2	Oval varnish brush	Rough work.
F–2	Flat varnish brush	Medium work.
Z–2	French bristle varnish brush	High-grade work.
Z–1	....do	do.
N–4	Lettering brush	Small surfaces.
N–8	....do	Large work.
K–2	Painter's dusters	Cleaning work.

To prevent bristles from falling out.—Steps should be taken to tighten the bristles of all brushes before they are put in use, since paint and varnish brushes which are in every way satisfactory at the time of inspection when delivered by contractors may, when issued from store, be defective in that they shed bristles to a very objectionable extent. This shedding of bristles has been ascertained to be due to the drying out of handles while in store. The bristles may be tightened by holding the brush in a vertical position with the bristles pointing up and wetting the end of the wooden handle inside the bristles with about a teaspoonful of water, then allowing about half an hour for the handle to swell, thus restoring the original pressure of handle and ferrule on the bristles; or it is still better to immerse the brush for 24 hours in water to top of ferrule.

To clean properly a brush.—No matter how good a brush may be, it will be ruined very quickly if improperly treated when not in use. A paint brush after use should be thoroughly cleaned in turpentine, petroleum spirits, or soap and water. If left in water for any length of time, the bristles are liable to twist and lose their elasticity. After cleaning, the brush should be kept in a trough containing a sufficient quantity of raw linseed oil to cover about one-half the length of the bristles. Large brushes should have a small hole bored through the handle well up toward the stock. A wire can be inserted so that the

brush can be suspended in the trough of oil. Brushes should never be stowed standing in buckets with the weight of the brush on the bristles. If large brushes are allowed to stand on the point, they soon lose their shape and become useless.

Note.—Should a paint brush become quite hard wtih paint it should be soaked for 24 hours in raw linseed oil and then in hot turpentine. This treatment will generally loosen up the bristles.

Varnish brushes should be suspended in the same kind of varnish with which they are used. If this method is not possible, boiled oil may be used instead. If a varnish brush has been thoroughly cleaned in turpentine, petroleum spirits, gasoline, or soap and hot water, it may be kept lying flat on its side in a suitable box.

Lettering brushes should be washed in turpentine, petroleum spirits, or gasoline until clean. If they are not to be used for some time they should be dipped in olive oil and smoothed from heel to point.

Shellac brushes should be kept in a small amount of mixed shellac or alcohol. Never put them in water. If the brush is not required for use in the near future, clean it in alcohol.

Binding of brushes.—To prevent the bristles in a round brush from spreading, it is good practice to bind the heel end of the bristles at the ferrule with cotton line. The effect of the serving or binding is to make the brush stiffer and to hold the bristles together. As the bristles become shorter, due to wear, the binding can be removed. Flat brushes need not be bound.

PREPARATION OF SURFACES TO BE PAINTED

Next in importance to a properly compounded, well-mixed paint is the careful cleaning of the surface. The old Biblical adage "A house founded on the sand will fall" holds true in paint work. The most expensive paint will be of little value as a protective or decorative coating if it is applied on an insecure foundation. The paint secures its hold on the surface by the penetration of part of the vehicle in the pores of the surface. If loose old paint, rust, dirt, dust, moisture, or grease exist on the surface, they will prevent the new paint from entering the surface pores.

It should be borne in mind, therefore, that the first essential to good paint work is the proper preparation of the surface. Any infraction of this rule on the part of a painter will surely result in loss of his labor and his employer's material.

When painting steel, it is very important to remove all scale, grease, rust, and moisture. Rust has the property of spreading and extending from a center if there is the slightest chance to do so. Hence a small spot of rust on the metal may spread *under the surface of the paint* until in time the paint will flake off. For this reason it is very essential that all traces of rust shall be removed. Deep-seated rust spots may be removed by applying heat from a painter's torch. The heat converts the rust into another form, which is harmless and can be easily dusted off.

A FEW DON'TS

(1) *Don't* use shellac as a protective paint on steel surfaces or where it comes in contact with water or damp conditions.

(2) *Don't* use shellac as an undercoating for outside varnish work.

(3) *Don't* do any puttying until the first or priming coat has been applied and is dry.

(4) *Don't* use boiled linseed oil for priming.

(5) *Don't* forget that no paint made will prove successful when applied over a wet or damp surface, whether such surface is wood, metal, plaster, or cement.

(6) *Don't* forget that painting or varnishing over a damp or "tacky" surface will cause blistering and "alligatoring" of paint and cracking of varnish.

(7) *Don't* apply varnish over a glossed surface. Hair-cloth or sandpaper will quickly remove the gloss and also improve the general appearance of subsequent coats.

(8) *Don't* attempt to produce a successful job of rubbing with water or oil and pumice stone or of polishing with rottenstone before the varnish is thoroughly dry.

(9) *Don't* forget that each coat of varnish must be thoroughly dry before applying another. If this fact is neglected, cracking will surely result.

(10) *Don't* try to preserve steel surfaces unless examinations are frequent, surfaces are thoroughly cleaned, and repainting carefully done.

(11) *Don't* forget that the volatile thinners used in paint are inflammable. Keep all flames away from open containers of paint.

POISONOUS EFFECT PRODUCED BY PAINTS

A brief description of the poisonous effects of paint and of the means of preventing such effects is considered of importance in a manual of

this character, because of the fact that some of the conditions under which poisoning can readily take place may be found on board ship.

However, there is no occasion for a man to be injured from the use of paint. There are very definite safety precautions incorporated in the *Bureau of Construction and Repair Manual* and other regulations which specify precautionary measures to be taken when painting. Personnel painting, and particularly personnel in charge of paint gangs, should be thoroughly familiar with these safety regulations.

Poisonous effects may be produced either by the vehicle or the pigment in the paint. Obviously the vehicle must be a volatile solvent, and as such it is given off to the air by the paint. Many different solvents are used and some of these are toxic if inhaled in considerable quantity. The symptoms usually noticed from inhaling such a solvent are irritation of the nose and throat, headache, dizziness, or conduct as if the man were drunk, that is, excitement, loud or boisterous conversation, loss of memory, and a staggering gait. This injury is not dangerous if the man is removed from exposure to the fumes, and he will make prompt and complete recovery. The danger is that if not removed he may become unconscious and receive a fatal exposure. The development of any of these symptoms indicates that the painter is being exposed to excessive amounts of the solvent vapor and that protective measures are inadequate. The protection against this danger consists of fresh air to the painter. This can be furnished either by an adequate supply of fresh air to the compartment, supplied preferably by exhaust of foul air, or by furnishing the painter fresh air by employing the Navy-type half mask described in the *C. & R. Manual*.

The pigment in paint may also be poisonous. This is usually due to lead. This pigment may be absorbed through the skin or inhaled as dust vapor or atomized particles, particularly if a spray gun is used. Protection against poisoning with pigment consists of carefully washing off all paint from the hands, and particularly cleaning under the finger nails, which should be short. This should invariably be done before eating and soiled hands should be kept away from the mouth and face. All soiled clothing should be changed. Respirators give fair protection against pigment; they give no protection against solvent fumes. If respirators are used, they should fit snugly, that is, permit no air leakage, and the filter should be changed frequently. Personnel exposed regularly to spray-gun work should have fresh air supplied through a face mask as described above.

Personnel chipping paint are exposed to the danger of poisoning by whatever poisonous pigment is in the paint work. The protective

measures necessary will therefore depend upon the danger involved.

Fresh paint oxidizes. Therefore a freshly painted surface absorbs oxygen, and if this surface is in a closed or poorly ventilated compartment, it can absorb so much oxygen that the air will not support life. Moreover, a very dangerous and odorless gas, namely carbon monoxide, is developed in this process. Consequently, freshly painted compartments and compartments long closed without ventilation must be entered with caution and as required by safety regulations.

In certain paint shops the paint surface is prepared for the paint by sandblasting or sandpapering. Particularly in the former process a very fine dust, some of which is sand, is developed. This dust is exceedingly dangerous and personnel exposed to it, either as sandblasters or helpers, should employ protective measures to prevent inhaling this dust. Filter-type respirators do not give satisfactory protection.

Prevention.—Use pumice stone and water or oil, or moisten the sandpaper with a cheap mineral oil which does not dry too slowly or too rapidly. The sandpaper will last as well with or without oil and the effect upon the paint is negligible.

Burning off oil paints.—This process is dangerous if the burnt-off part of the paint is allowed to remain on the floor and be powdered by being stepped upon. The flame of the torch should not be allowed to play long enough on the surface of the paint to produce a smoke. The heated oil fumes may cause headache. Fine particles of lead may be carried mechanically along with the flames and thus be inhaled.

Handling putty.—Before handling putty, the painter should coat his hands with soapsuds or raw linseed oil. This will prevent the putty from sticking to the hands and will permit easy cleaning.

Poisoning due to pigments.—*All* varieties of lead pigments are considered poisonous. Their toxic effects are known as lead poisoning.

Cause of lead poisoning.—Lead poisoning is not caused by the vapors given off by a freshly painted surface, but may result from the following:

(1) Mixing dry lead with oil paint.

(2) Dry sandpapering of lead-painted surfaces.

(3) Rubbing or chipping off old paint.

(4) Burning off old paint.

(5) Inhaling dust from dirty working clothes and from dirty drop cloths.

(6) Inhaling fine particles of lead paint from a paint-spraying machine.

(7) Carrying lead paint into the mouth from unwashed hands.

CHAPTER 30

M—SWIMMING; LIFE SAVING; LIFE BUOYS

Life-saving methods 295
Artificial respiration 302
Life buoys 305

SWIMMING is discussed in detail in Part I, Chapter 15.

LIFE-SAVING METHODS

(Illustrations and portions of text by courtesy of the American Red Cross)

Persons in distress in the water should try to throw themselves on their backs in order to float in that position, or should seek support from objects close at hand. As a rule, it is a mistake to try to swim to the shore.

Disrobing.—A life saver is advised to remove shoes and any heavy clothing before plunging in to make a rescue. If clothing must be removed in the water, take a deep breath and allow yourself to be submerged while unlacing your shoes. Work at laces with both hands. Avoid hurried movements, as in the water they will soon exhaust your strength.

After removing the shoes, remove trousers, then jumper or coat. These latter often fill with air and help keep you afloat.

When clothing has been removed, swim to the rescue, resting on your back if necessary.

Approaches.—In approaching drowning persons, swimmers should get their attention and reassure them by calling in a loud voice that assistance is at hand.

It is safest to approach a drowning person from the rear. Swim to a point directly behind him, reach one hand under his chin and pull his head back. At the same time place the other hand under his back at the base of spine to raise him into a

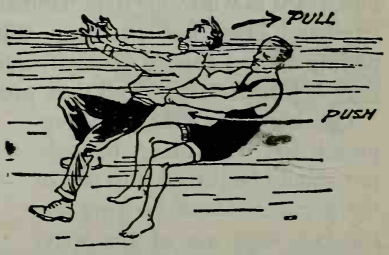


FIG. 30-1—Rear approach.

horizontal or floating position. Still holding his chin in one hand, start swimming with free hand and scissors kick until body is moving along smoothly, the theory being that a moving body always floats better; then change to carrying position. By this method the rescuer will find that the carry is greatly facilitated.

When it is impossible to approach from the rear, either the under-water or the surface approach can be used. The under-water approach is undesirable where the water is very muddy and it might be difficult to locate the subject under the water.

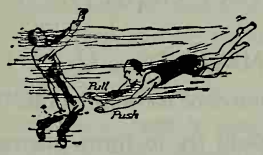


FIG. 30-2—Under-water approach.

FIG. 30-3—Turning subject about.

To make the under-water approach, swim to a point about 6 feet in front of subject, dive under and grasp his knees, turning him about. During the dive and in reaching for the subject's knees, keep your arms straight before you to avoid getting close enough to him to have him grasp you with his legs. After turning the subject about, come up behind him and proceed as in rear approach.

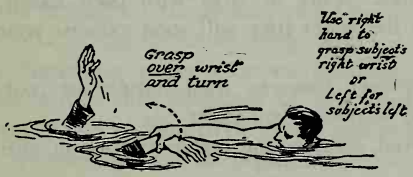


FIG. 30-4—Surface approach.

To make surface approach, swim toward subject, facing him, reach in with your right hand and grasp his right wrist, or with your left hand grasp his left wrist. While treading water, lean backward, pulling subject toward yourself, quickly spinning him around until his back is turned to you, and then proceed as in rear approach.

Carries.—Once the proper approach has been made, the subject should be turned into one of the five methods of carrying and his face kept out of the water while he is being carried.

FIG. 30-5—Head carry.

Head carry.—Cover the sub-

ject's ears with palms of your hands, so that your middle fingers rest along his jawbone on each side. Holding his chin high to arch the subject's back, swim, using frog kick or vertical or reverse scissors kick. In the latter, the hips are tipped slightly to one side and legs separated as in side stroke but with upper leg opening backward and under leg forward, reversing the ordinary scissors kick to avoid fouling the subject.

Cross-chest carry.—From position back of the subject, reach across his shoulder and chest, placing your hand under his farther armpit. (Shoulder blade is more comfortable if you can reach it.) Hold the subject so that your hip is directly under the center of his back and his shoulder tight under your armpit. Swim on your side, using scissors kick and side-arm pull.

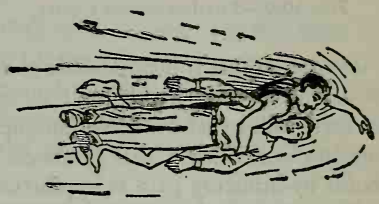


FIG. 30-6—Cross-chest carry.

This carry is a favorite among life savers because subject is completely under control.

Hair carry.—From a position back of the subject, place your hand at the crown of his head, your fingers toward his forehead, grasping a handful of hair. With your hand in this position he will not roll over. Swim on your side with side-arm pull and scissors kick. Keep your holding arm straight.

FIG. 30-7—Hair carry.

This carry is especially easy to learn and is optional with the arm-lock carry.

Arm-lock carry.—From a position back of the subject, reach under his near arm and grasp his farther arm at the biceps, or at the wrist if he is too large. This puts the elbow low to raise hips.

FIG. 30-8—Arm-lock carry.

Your arm being under the subject's back, he is raised high in the water as you swim with scissors kick and side-arm pull.

Keep the subject close to you, his near arm pressed tight against you.

Tired-swimmer's carry.—This carry is intended only for assisting a person who has become tired. It should never be used on a struggling person.

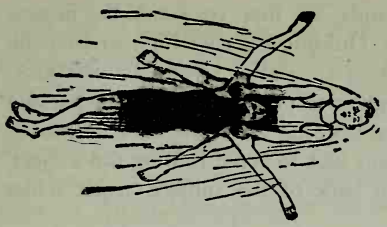


FIG. 30-9—Tired-swimmer's carry.

Simply swim to the subject, telling him to lie on his back and to place his hands on your shoulders, with his arms straight and feet spread apart.

Swim breast stroke, using either frog or scissors kick. Watch the subject's face.

Release methods.—If the drowning person is struggling violently, so that it is impossible to subdue him or grasp him with safety, it is well to simply wait for him to exhaust himself before attempting to carry him to safety. Never attempt to strike the subject to render him unconscious. Such a feat is almost impossible in the water. Breaking holds by inflicting pain is impractical also. It may work in practice, but a desperate man fighting for his life will not be affected by such methods.

Practice the proper approaches and use them in emergencies to avoid being caught in the hold of drowning person. The following release methods are effective, and it is advisable to be familiar with them, but the use of the proper approaches will lessen the danger of your being placed in such a position that the release methods will be required.

Each of these methods is followed by the proper turn, getting the subject in a horizontal position and starting the carry. In breaking holds let yourself be submerged with the subject, performing the break under water. This is done because a drowning person releases a hold more readily under water, his constant desire being to climb to the surface to obtain air. Utilize this tendency to escape.

Front strangle hold.[1]—You are grasped tightly around the neck from the front, the subject's head over your shoulder.

FIG. 30-10—Front strangle hold.

[1] The efficiency of this method depends on the snap with which it is executed. Practice it slowly until you have the technique mastered, then perform the *push, lift,* and *duck,* all in one quick movement.

If the subject's head is over your right shoulder, put your right hand on his right cheek, little finger against side of nose with thumb hooked under angle of lower jaw, and push his head toward your right and at the same time put your left hand on the subject's encircling arm above the elbow and lift, following through, pushing toward the right. Then duck under this arm as you raise it, and continue pushing with both hands until the subject is turned with his back to you. Proceed as in rear approach.

If the subject's head is over your left shoulder, use your left hand on his left cheek, and your right hand to lift his left arm.

Back strangle hold.—You are grasped tightly around the neck from the back. Grasp the subject's lower hand and *twist* it down and in toward his body. With your other hand, grasp his lower arm at the elbow and *push up*.

Turn your head in the direction you are to turn him, duck *under* this arm as you raise it, and continue twisting his hand until he is turned back to you, and his arm is in a hammer-lock position, to raise his hips. Use your other hand for a chin pull to get his body flat on the surface and swim with the hand that held wrist. Shift to cross-chest carry.

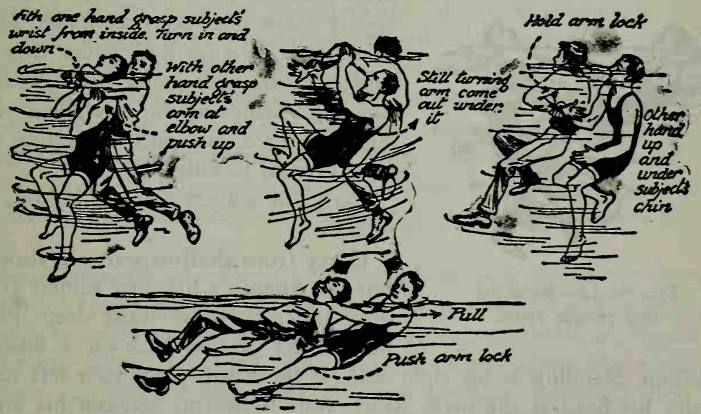


FIG. 30-11—Back strangle hold.

If the subject's left arm is the lower, use your left hand to raise his elbow and your right hand to twist his hand.

If the subject's right arm is the lower, reverse the process.

Double grip on one wrist.—The subject grasps your right wrist with

both hands. Put your left hand, which is free, on the subject's left with the thumb on top and fingers under, ready to pull as soon as your foot is in position. The foot is used to push on the opposite shoulder as the arm is pulled toward you.

Use your left foot against the subject's right arm pit, bringing it over his arms. Be careful about kicking him in the chest or breast. Caution all candidates to push in the hollow of the shoulder and not below it in practice. Straightening the leg as you pull with the left hand gives the necessary force to break the hold. The right wrist naturally turns against the thumb which is holding it.

If you find that you are unable to reach the subject's shoulder with your foot, due to your shorter reach, bend your elbow until your foot is in contact.

When the hold is broken, turn into position for rear approach and push his body up into a carrying position. Should the left wrist be grasped, reverse the procedure, pulling with your right hand and pushing on the left shoulder with the right heel.

Breaking two people apart.—Two people are clinging together in a front strangle hold. Swim to a point directly behind one of them, and place your hands on his throat (Adam's apple) ; raise one foot over locked arms of subjects, placing heel under chin of subject facing you against his neck, also pressing Adam's apple; straighten your leg, *push* hard, and pull, separating the two. (Avoid kicking.)

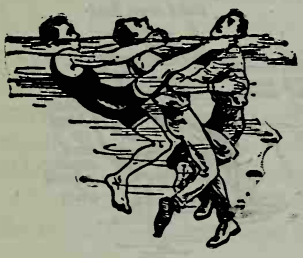


FIG. 30-12—Breaking two people apart.

Carry the subject you are holding to safety.

Carry from shallow water to shore.—For the fireman's lift, tow subject from deep water to water waist deep. Place the subject on his back in a floating position. Standing at his right side, at the waist, place your left hand under his head at the neck. Reach your right arm between his knees from above, grasping his left knee. Duck by bending knees and roll subject face downward over your head as you go under water. Stand up and the patient will be evenly balanced on your shoulders and held in place by your right arm, which is now around his right knee, your right hand clasping his right wrist, leaving your other hand free.

Many people prefer the *saddleback carry.*

For the saddleback carry, bring the subject to a floating position in waist-deep water. Standing at his right side, facing the head, reach your right arm across the waist from above, lifting his left arm out of the way until it rests upon your shoulders. Continue to reach with right arm until hand is lifting the subject's head out of water. Use your left arm to catch both of his legs behind the knees as you turn, bending him

First Position *Final Position*
Fireman's Carry *Saddleback Carry*

FIG. 30-13.—Carry from shallow water to shore

across your hips. The weight should be above your belt line to insure easy balancing.

To lower patient from the saddleback position, the rescuer kneels on both knees and leans backward until the patient rests upon the ground behind your heels.

Lifting from water.—To lift a subject from deep water to the edge of a tank, onto a float, or over the stern of a boat, proceed as follows: Hook the subject's fingers over the edge, placing one hand on top of the other, resting one of your hands on subject's hands to hold them in place, then climb up on float or side wall and grasp the right wrist of the subject with your right hand and his left with your left. With the subject facing you and with your wrists crossed, raise and lower him several times to gain momentum, and with a final lift pull him out of the water, uncrossing your hands as you land him in a sitting position facing the water. He can then be pulled into a reclining position without difficulty.

Resuscitation.—Anything which interferes with the supply of good air to the lungs and prevents the escape of the used air will cause suffocation, such as the presence of a poisinous gas or smoke, an electric or lightning shock, drowning, and hanging. When found the person is usually unconscious; lips, nails, and skin are blue, and respiration has ceased. If seen earlier, there is an occasional gasping breath.

When a person is shocked by electric current, first shut off the current if it can be done quickly. Otherwise set about removing the subject from contact with the wire or rail. During the process of removal, the rescuer must not come in contact with the body of the person shocked; use rubber gloves, rubber coat, silk, dry board, dry cloth.

In gas poisoning from automobile exhaust gas, illuminating gases, and gas from burning charcoal, the carbon monoxide combines with the blood, actually diminishing the amount of oxygen the blood can absorb.

ARTIFICIAL RESPIRATION

The prone-pressure method of artificial respiration described in these rules should be used in cases of suspended respiration from all causes—drowning, electric shock, carbon monoxide poisoning, injuries, etc. Follow the instructions even if the patient appears dead. Continue artificial respiration until natural breathing is restored or until a physician advises you to discontinue your efforts.

(1) Lay the patient on his stomach, one arm fully extended overhead, the other arm bent at elbow and with the face turned outward and resting on hand or forearm. This protects the mouth and nose from dirt, provides a slant to head for drainage, and allows tongue to drop forward (Fig. 30-14).

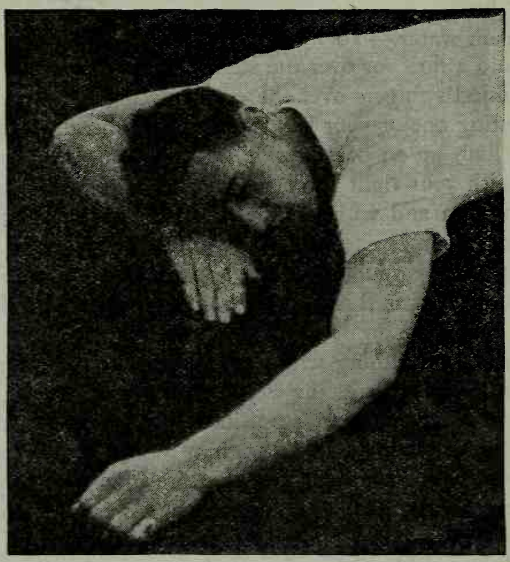


FIG. 30-14.

(2) Kneel, straddling the patient's thigh or thighs, with your knees placed at such a distance from the hip bones as will allow you to assume the position shown in the figure.

Place the palms of the hands over his lower ribs, one on each side of the spine, about 4 inches apart, at right angles to his spine, with the thumb and fingers in a natural position. The hands are in correct position when the little finger of each hand is over and following the line of the lowest rib (Fig. 30-15).

(3) Move the weight of the body slowly downward and forward for 3 seconds (count 1—2—3 slowly); do not let your hands slip. Keep your arms straight. The shoulder should be behind the hands, so that the pressure exerted is forward as well as downward, and by the "heels" of the hands, and not the fingers (Fig. 30-15).

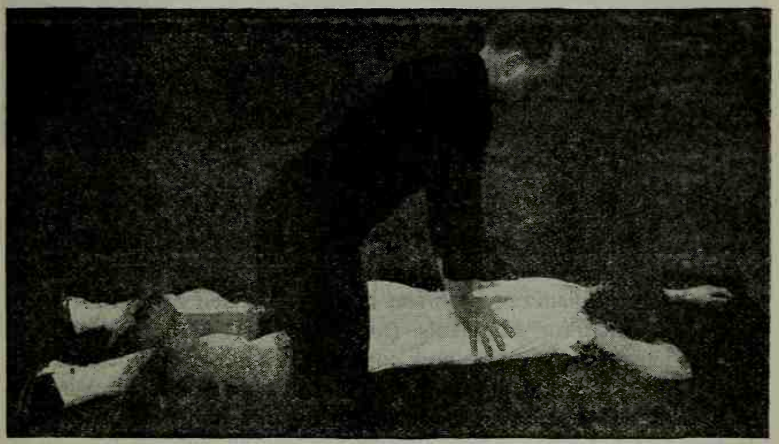


FIG. 30-15.

(4) Release the pressure suddenly, removing the hands from the chest, allowing the chest to expand and fill with air (Fig. 30-16). After a 2-second interval (count 1—2 slowly), repeat the pressure. This makes one respiration every 5 seconds, 12 per minute. *Do not work faster than this.* After rhythm is obtained, actual counting can be stopped.

During the interval the operator can swing back and sit on his heels, thus relaxing the muscles of his back. This will enable him to work for a much longer period.

(5) Do not give up! There are cases on record of resuscitation after 30 minutes submersion. There is no certain sign by which you can determine that it is too late for artificial respiration. If no results are seen, the patient should not be abandoned until at least 3½ hours of effort have been made to revive him.

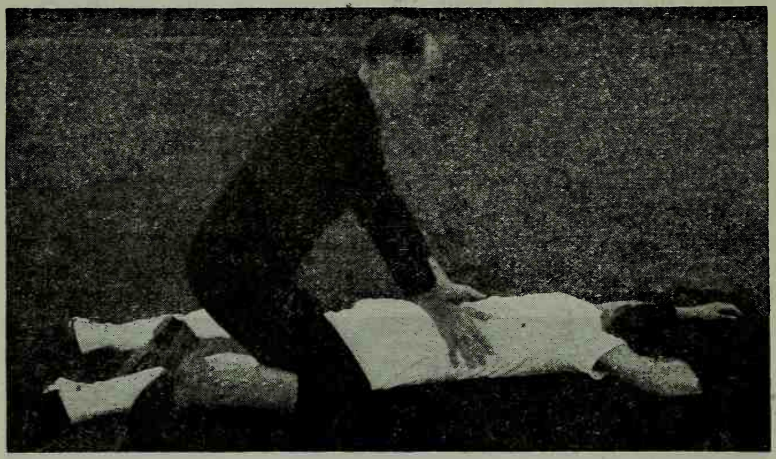


FIG. 30-16.

Supplemental treatment.—While carrying on artificial respiration, organize helpers, but *do not stop artificial respiration for anything*. Send for a physician, blankets, hot-water bottles or heated bricks, hot water or tea or coffee for stimulants (no alcoholics). Have the patient's clothing loosened around his neck and chest, his mouth and nose cleared of any mucus or mud, and his tongue moved back and forth occasionally to stimulate reflexes; his body and limbs rubbed toward the heart. Have blankets and hot-water bottles applied but not any hot articles next to the patient's skin. If there is aromatic spirits of ammonia at hand, have some poured on a handkerchief and placed near the patient's nose. Have the crowd that may have collected kept well back so as to give the patient plenty of air. Select an intelligent helper to watch you and so instruct him that he may be able to take your place when you need a relief.

When the patient begins to breathe and can swallow, give him sips of aromatic spirits of ammonia (teaspoonful to ¼ glass of water), or hot water, coffee, or tea. Do not allow the patient to walk or otherwise exert himself; he should be carried to some place where he can be put in bed and receive medical attention.

Caution.—Often inexperienced or excited persons attempt to administer artificial respiration when there is no need for such treatment. It is not required when the patient, on removal from the water, is able to breathe. Such cases are in need of treatment for exposure and shock.

They should be placed on a slanting surface, head down; covered by blankets and hot-water bottles; stimulated by hot drinks or aromatic spirits of ammonia (teaspoonful to ¼ glass of water); massage of limbs; carried to a bed for further medical attention.

Summary.—Save the seconds and you have a better chance of saving the life. Do not waste time carrying the patient to a quiet spot. Work where he is taken from the water. Do not waste time trying to get water out of the stomach. *Turn the patient's face down and go to work immediately.*

Suffocation.—Suffocation from foreign bodies in the windpipe, from hanging, and from the inhalation of poisonous gases is treated by removing the cause, and by proceeding with artificial respiration as in the case of suffocation from drowning. A line should be made fast to a man before sending him down into double bottoms, blisters, oil tanks, voids, or other places where the presence of irrespirable gases may be found.

LIFE BUOYS

The *Navy Regulations* require that, at all times at sea and when anchored in a strong tideway in port, an efficient person be stationed to let go the life buoy. Except in small ships, one man is usually detailed to each life buoy. At sea these men also act as lookouts. All ships and ship's boats are provided with circular life buoys, which are placed in positions where they can be dropped or thrown overboard in an emergency. Large ships have copper-covered buoys in racks amidships and aft on both sides, with calcium flare pots attached, which can be dropped by pulling a toggle and which show a light as soon as they are in the water. On some vessels these buoys may be dropped by electrical control. In addition to these, ordinary ring life buoys, with or without life lines attached, are placed on the bridge and aft on the main deck for use if necessary. All men must know how to drop these life buoys and know their exact location on the ship.

To select the proper time to let go the life buoy requires coolness and composure. A cool, intelligent man will let the buoy drop within a few feet of the man overboard; but an excitable man, or one who does not clearly understand his duties, may drop it long before the man is abreast the buoy or long after he has passed. He should try instantly to find out the side on which the man fell and to get sight of him; then drop the buoy as soon as possible after the man is abreast the buoy, so that it will be between him and the ship toward which he naturally faces and swims. The man at the life buoy can usually determine on which

side he fell, as he will see many of the people about the decks go to that side. Then, to avoid the possibility of dropping the life buoy on the man (instances have been recorded where men have thus been killed), the opposite buoy should be dropped when it is adjudged to be abreast of the man in the water.

If it is seen that the second buoy can be dropped nearer to him, it should be let go; but, as a general rule, the second buoy should be kept fast (unless it is really necessary) for use in case men fall overboard in lowering or hoisting the lifeboat. The man in the water should swim to the life buoy and await the lifeboat. Life buoys should be dropped frequently when the crew are in swimming in order to familiarize the men with their use. The life-buoy men should keep the man overboard in sight until the persons especially detailed for this purpose reach their station.

CHAPTER 31

N—ATHLETICS

ATHLETICS ON BOARD SHIP

General.—Athletics, being an important factor in the development of good morale, are encouraged both ashore and afloat. Every effort is made by commanding officers to form as many teams covering the various sports as is possible in their organization, so that the benefits of athletics may be enjoyed by the greatest number of men. Every facility is given enlisted men to take part in athletic contests, not only between ships and stations but in competition with outside teams. However, participation by ship or station teams in athletic sports or by individuals in professional boxing and similar contests over which commandants, commanders in chief, or commanding officers have no jurisdiction shall not be allowed. No men shall be allowed to accept money for services as members of athletic teams. Athletics in our Navy are run on the same principles as obtain in all colleges and universities, and the amateur standing of all contestants must be carefully maintained.

United States Fleet athletic organization.—The commander in chief, United States Fleet, in order to standardize and regulate the conduct of United States Fleet athletic competitions, issues general regulations covering all athletics. All fleet and force commanders under the commander in chief, United States Fleet, issue athletic rules and regulations for their commands in accordance with these general regulations. A United States Fleet athletic board, consisting of the chief of staff, United States Fleet, and the athletic officer of each fleet and force unit supervises all athletics in our Navy.

Fleet and force athletic organization.—Each fleet and force has athletic boards consisting of the fleet or force athletic officers and the athletic officers of the various units under them.

Ship or station athletic organization.—Each ship and station has an officer in charge of athletics. He appoints other officers to assist him and to take charge of the various athletic teams. In this manner a large number of both officers and men are actively engaged in athletics.

Regulations.—No man shall be eligible for participation in any United States Fleet athletic event who is not regularly attached to and serving on board a ship of the fleet.

No cash prizes shall be given on board ship or ashore. To accept cash prizes puts the contestant in the professional class, and all Navy athletics are strictly amateur.

Men who engage in contests ashore that jeopardize their amateur status shall be deprived of all training privileges on board ship and furthermore shall be barred from competition in the United States Fleet boxing or wrestling championships.

Officers are not permitted to enter field and track meets, swimming races, boxing bouts, or similar events. One officer shall be permitted to take part as a member of a baseball, football, and basketball team. If one officer is taken out of a game, another officer may be substituted. This prohibition, however, does not apply to warrant officers. Officers, including warrant officers, are not permitted to act as coxswain in any official United States Fleet pulling race.

The rules of the Amateur Athletic Union shall govern all United States Fleet athletic contests except wrestling, which shall be governed by the rules of the National Collegiate Athletic Association.

Note.—Our Navy has won a place in athletics which is not surpassed by any university or college in our country. It must be the duty of all officers and men to see that this high standard is never jeopardized by stains of professionalism or by any unsportsmanlike conduct on the athletic field. Rooting parties should encourage their team to the bitter end, but at the same time give good-hearted and full credit to the opposing team and never use abusive or unsportsmanlike methods toward them.

Championships.—When the United States Fleet is in company, the commander in chief will arrange for a series of fleet championships in as many athletic events as may be practicable.

The commander Scouting Force and the commander Battle Force will conduct eliminations and nominate the entries for the events to the commander in chief, United States Fleet.

Trophies are awarded for fleet championships of the various weights in boxing and wrestling. In other sports the ships of the United States Fleet compete by types. Appropriate trophies and awards are made for type championships.

Medical officer at athletic contests.—A medical officer attends all boxing and wrestling contests. This officer has authority to stop any contest. He is specifically notified for the duty and attendant authority.

No man may enter a boxing or wrestling contest until he has been examined on the day of the contest by a medical officer of the Navy and pronounced by him physically fit for the contest. The contestant secures

a certificate from the surgeon making the examination and presents it to the referee.

Previous to every bout contestants are stripped and weighed in by the referee at about 2100 on the day of the scheduled bout. Contestants who fail to make the required weight within one hour of first weighing in forfeit the bout. Each contestant is furnished a certificate of weight by the referee to be presented at the ringside if demanded.

Entries failing to qualify as to weight or failing to appear at the scheduled time of a contest thereby forfeit the bout.

Prestige attendant upon victory.—A healthy athletic spirit aboard ship puts a never-say-die spirit into the whole ship's company. It tends to make that ship's company a unit, a unit which will never give up and which will carry that ship over all difficulties. It develops an *esprit de corps* that will carry the ship to high achievements in every other line of duty. As the spirit, the fight, the success of athletic teams of universities and colleges have made them the beacon by which its students have been led to big achievements in life, so do our athletic teams inspire in all of us that spirit which leads us all to do the big things required of us.

Competition between ships of the various forces is held in most sports. Points are assigned for winning or placing in each event, and the ship having the highest total is assigned the general excellency trophy for her class. A ship standing high in athletics in our Navy represents an achievement equal to that of any university which stands high in athletics among universities of her class.

Clean sportsmanship.—The following excerpt from the *Battle Fleet Athletic Rules* is quoted for the information of "all hands," as the expressions therein set forth should be the guide for us in all our athletic competitions:

> The commander in chief desires to urge upon all that athletic competition, unless it is characterized by *clean sportsmanship,* free from any taint or suspicion of sharp practice, and free from any unfriendliness, is not the spirit of true Americanism, which is to play fair and give a square deal. Winning or losing, the main thing is to show yourselves good and clean sportsmen—*modest winners* if the breaks are with you, and *good losers* if the breaks are against you.

PART THREE

RUDIMENTARY SEAMANSHIP AND GUNNERY

CHAPTER 32

BOATS

Classes and types 313
Terms used with boats 315
Boat gear carried 316
Boat chest 318
Medical emergency box 319
Cooking utensils 319
Provisions 320
Fire-fighting equipment 320
Stowage of boats 321
Boat salutes 322
Duties of a boat keeper; salutes required 325
Lifeboats 327

A BOAT is a small craft that can be hoisted aboard a large vessel. Never call a ship a boat; it is lubberly.

CLASSES AND TYPES

Boats used by the United States Navy are divided into two general classes, (1) *power boats* (mechanically propelled) and (2) *pulling boats* (propelled by oars).

Boats are further identified by type; and, within a type, by over-all length in feet, to the nearest foot (inches disregarded). Standard boats in use, listed by common usage names and by lengths in feet, are as follows:

Power boats.—

Motor boats.

Motor launches (fitted with sails only on specific approval by Bureau).

Motor whaleboats.

Pulling boats.—

Whaleboats (sails are included in outfit).

Dinghies (sails are included in outfit).

Wherries.

Punts.

Racing cutters.

Standard boats are frequently altered and fitted with special equipment for such purposes as airplane salvage work, gasoline delivery, and survey work. In addition, a number of boats are built for special purposes, such as aircraft rescue boats, survey boats, sail boats, surf, landing, and beaching boats, and torpedo retrievers.

Standard boats used by the United States Navy may be briefly described as follows:

Motor boats are fitted with canopies and are used as officers' boats and for dispatch service. Motor boats used by flag officers are known afloat as *barges,* and those used by commanding officers and staff officers as *gigs.* Barges are generally transferred from ship to ship with the flag. Motor boats are not fitted to mount guns. The 20-foot motor boats for submarines have a buggy-top canopy.

Motor launches are undecked work boats for heavy duty, having square transom sterns. They are designed for such services as carrying stores, liberty parties, kedging, etc., and are frequently fitted with special equipment for survey work. With the exception of the 24- and 26-foot launches, all are fitted for mounting a light gun in the bow.

Motor whaleboats are double-ended boats, which are convenient for a wide variety of light duties. Large ships are supplied with the open type for use as lifeboats in addition to the pulling whaleboat. The hooded type, which serves as an officers' boat, is furnished to vessels that have no other canopied boats. Both types have a steering oar which may be shipped for lifeboat duty.

Whaleboats are double-ended pulling boats, pulling 5 oars single banked (24-foot size), and 12 or 10 oars double banked (30-foot and 28-foot sizes, respectively). The 24-foot and 28-foot boats are fitted with lug rig, without centerboard. The 30-foot boat, issued only to large ships is designed especially for sailing and has a ketch rig and centerboard. All whaleboats are fitted with swivel rowlocks and for lifeboat work are provided with a steering rowlock. Whaleboats are used as lifeboats, although the open-type motor whaleboat is generally preferred.

Dinghies are small, handy boats with transom sterns. They are pulled by 3 or 4 men, each with 1 or 2 oars, depending on the size and design. Owing to the small crew required, they are particularly convenient for nearly all light work in port. They carry sails and are sprit rigged.

Wherries are light handy boats with transom sterns. They may be pulled by 2 or 3 men, each using 2 oars, and are not furnished sails.

Punts are square-ended, flat-bottomed boats, intended for painting

and general cleaning around the ship's water line. They are fitted with rowlocks but are usually propelled by sculling.

Racing cutters are lightly built boats with transom sterns, designed to stimulate interest in oarsmanship and for recreational competition. While they are sturdy and strong for the purpose intended, they are not suitable for general use and are not provided with sails. They are issued only to the larger ships. As these boats are used in competitive racing, all alterations and changes without specific Bureau approval are prohibited.

Each boat is furnished with a label plate with exact data to suit the particular boat, similar to the following:

50-FOOT MOTOR LAUNCH
BOAT REGISTRY No. —— MAXIMUM CAPACITY, 190 MEN
(Maximum capacity includes boat crew, assumes all passengers in cock pits and seated as far as possible.)
NAVY YARD, ———, OCTOBER, 1930. C&R PLAN No.

TERMS USED WITH BOATS

Balsa wood is the lightest known wood.

Double-ended, as applied to a boat, means that both bow and stern are of approximately the same bow shape.

Double-banked means that there are 2 oarsmen on each thwart, each pulling an oar.

Grommets are rings formed of rope.

Sculling is propelling a boat by making a figure-of-eight motion with the blade of a single oar at the stern of the boat.

Single-banked means that only 1 oar is pulled from each thwart. Alternate oars are on opposite sides.

Tholepins are pins placed in the gunwales of a boat. The grommet is secured around the oar with a half hitch and then looped over the tholepin. The pulling should be against the grommet and not against the tholepin.

BOAT GEAR CARRIED

Pulling boats.—The following boat gear shall be carried by pulling boats (racing cutters excepted) at all times, except in punts and when special circumstances render it undesirable in other boats:

(1) Anchor with chain or line bent and ready for use.

(2) Bow painter.

(3) Stern fast.

(4) One complete set of oars. If swivel rowlocks or tholepins and grommets, which do not permit tossing, are used, each oar must be fitted with a trailing line.

(5) Spare oars as prescribed in the boat outfit list (fitted with trailing lines if rowlocks are used).

(6) Boat hook.

(7) Spars, sails, blocks, rigging, spar cover, and sail bag complete and ready for use. (Spars and sails are not furnished for racing cutters, wherries, and punts. They are furnished for pulling whaleboats.)

(8) Boat bucket for bailing and for general use.

(9) One breaker (filled), of smallest size.

(10) One set of stretchers, complete.

(11) One canvas bag containing 1 boat ensign and staff, a pair of semaphore flags on staffs, 1 answering pennant and staff, 1 boat-distinguishing flag and staff, and, in case of a special boat, appropriate flag or pennant and staff.

(12) Boat compass.

(13) Tin box with cover (unless locker is provided) for cleaning gear.

(14) Rudder and tiller, each fitted with a light lanyard.

(15) Plug secured to keel by a chain.

(16) Full set of rowlocks and 2 spare ones (if swivel rowlocks are used), each fitted with a short lanyard.

(17) One set boat fenders fitted with lanyards.

(18) When a boat is to be absent from the ship after dark, it shall carry a deck lantern lighted and placed in the boat bucket ready for use. This is necessary because "Rules of the Road" require pulling boats to have such a light and show it at such times as are necessary to prevent collision.

Whaleboats carry, in addition to items (1) to (18):

(19) Ring life buoy.

(20) Steering oar and crutch.

(21) Life jackets when rigged as lifeboats. A tarpaulin and a grapnel, fitted with short chain and line, are supplied for each boat for use as needed.

Punts are only supplied with oars, rowlocks, and painter.

Power boats.—The following articles form the complete equipment of a power boat, and shall be carried at all times, except when special circumstances render it undesirable:

(1) Anchor with chain or line bent and ready for use.

(2) Bow painter.

(3) Stern fast.

(4) Two oars with oarlocks, or grommets and tholepins (for motor boats only on long trips and at abandon ship).

(5) Boat hooks.

(6) Boat bucket.

(7) Breaker filled with drinking water.

(8) Canvas bag containing a boat ensign and staff, a pair of semaphore flags on staffs, 1 answering pennant and staff, 1 boat-distinguishing flag and staff, and, in case of special boat, appropriate flag or pennant and staff.

(9) Boat compass.

(10) Tin box and cover (unless locker is provided) for cleaning gear.

(11) Set of fenders fitted with lanyards.

(12) Cushions and cushion covers. (Motor launches and open motor whaleboats are not furnished cushions.)

(13) Necessary fuel, lubricating oil, waste, etc.

(14) Deck lantern, trimmed, filled, and ready for lighting.

(15) Necessary tools for service of engine.

(16) Two circular life buoys, one aft and one forward, neatly secured where readily detachable.

(17) Life jackets, readily accessible.

(18) Running lights, foghorn, and fog bell as required by "Rules of the Road."

(19) Grapnel fitted with short chain and line.

(20) A bucket of sand for extinguishing gasoline fires.

(21) CO_2 fire extinguishers.

(22) Tarpaulin, except in 26-, 35-, and 40-foot motor boats.

(23) Rudder and tiller (on motor boats, tillers are not used).

Gas-powered boats are allowed two 15-pound capacity, portable CO_2

fire extinguishers, unless the one for the engine compartment is replaced by stationary equipment. Motor launches, except the 24-foot, are allowed two of the above extinguishers. Motor whaleboats and the 24-foot motor launches are allowed one. These should be stowed where they can be reached easily and outside the engine compartment, except the fixed system given motor boats for that place.

General.—The compass, unless secured in a boat, shall be habitually kept in the navigator's storeroom when the boat is not in the water.

Boat chests are carried as a part of a ship's allowance on a basis of 1 chest for each 3 power boats, or fraction thereof, in lengths greater than 26 feet. They are issued temporarily to any boat on detached service.

Water in breakers shall be renewed as necessary to keep it palatable and healthful.

Awnings and stanchions, or canopies for motor launches, are only issued when the special service of a boat makes them desirable.

Where possible to stow them conveniently and with reasonable preservation, the number of life jackets carried shall be equal to the maximum capacity shown on the boat's label plate. Where such is not possible, the number carried under normal conditions may be reduced to 50 per cent, at the direction of the commanding officer.

Boats' crews are responsible for the upkeep and preservation of all equipment. Any loss or damage to it must be reported to the coxswain because it is his duty to make a report to the officer of the deck. Most equipment is title B and must be accounted for.

Life jackets should be aired as often as is necessary to keep them dry.

Attention is invited to the fact that all articles and equipment are provided to meet situations likely to arise in the operation of the boat. It is the responsibility of the officer under whose authority the boat is operating to insure that all such articles are aboard when needed and to supplement the outfit listed in the *Manual* as may be necessary to meet the requirements of any special mission.

BOAT CHEST

The boat chest must be water-tight; it must be provided with a lock and key. It shall contain the following articles:

(1) Axe, 4-lb., 23″ length.
(2) Hatchet, shingling, 4″ wide.
(3) Hammer, claw, 16-oz.
(4) Screw driver, 8″ blade.
(5) Chisel, hand, cold, 7/8″ wide.

(6) Iron, calking, boat, 1½″ wide.
(7) Pliers, combination, 10″ slip joint.
(8) Brace bit, ratchet, 8″ sweep.
(9) Brace, bits, auger, ¼″, ½″, ¾″, and 1″.
(10) Marlinspike, 8″.
(11) Palm, sewing.
(12) Needles, sailmaker's, assorted.
(13) Nails, steel wire, assorted.
(14) Screws, brass, wood, assorted.
(15) Tacks, copper, ¾″.
(16) Lead, sheet, 3 lb. per sq. ft.
(17) Seizing wire, ⅛″ diameter.
(18) Lamp wick, cotton, 2¾″ ball.
(19) Yarn, spun.
(20) Twine, sail, 4″ ball.
(21) Lines, fishing, on reels, 7″ x 3¾″ x 1¾″.
(22) Hooks, fish, assorted.
(23) Sinkers, for fishing lines, 16-oz.
(24) Lantern, boat signal, bull's-eye (shutter).
(25) Oil, illuminating, 1 pint can.
(26) Tallow.
(27) Candles.
(28) Matches, safety, in hermetically sealed package.
(29) Lead, sounding, 5-lb.
(30) Line, lead, boat, cotton braided (19 fathoms long).

MEDICAL EMERGENCY BOX

A small medical emergency box is assigned to each boat. These boxes are kept in a designated place on board ship, and placed in the boats only when required for drill or service. Each box contains an itemized list of articles and directions for their use.

COOKING UTENSILS

Cooking utensils are supplied only when required. For example, at abandon ship they are undesirable complications. Boat expeditions may or may not require them, depending upon the nature of the service.

The cooking outfit for boat expeditions, when it is expected to do cooking in the boat would consist of (1) galvanized-iron bucket or pan filled with sand, (2) fuel, (3) kettle and frying pan, (4) mess gear.

Additional portions of the ration, such as butter, salt, pepper, sugar, coffee, etc., would be necessary. These can be most expeditiously supplied by the men who provide mess gear, if they are to be supplied in small quantities. If providing for a considerable force ashore, the amounts of each shall be carefully determined and provided by the commissary officer.

PROVISIONS

The amount of provisions and water carried under various circumstances will depend upon the probable length of service and the probable requirements of the expedition.

(1) *Bread,* if carried, will be carried in water-tight tins. These should be supplied in wooden boxes in order to preserve the tins intact.

(2) *Fresh water* is carried in breakers containing 3, 5, or 8 gallons each.

(3) *Canned meats,* if carried, will be in wooden boxes in which packed.

(4) *Coffee, tea, sugar, and salt,* if for a small expedition, are carried in small water-proof packages; if provided by the commissary officer for a considerable body of men, in the original cases in which received.

Other portions of the Navy ration may be carried in actual service when time and circumstances permit.

Except in an emergency, such as abandon ship, the commissary officer will ration men leaving the ship, having in mind the character of the service and probable time of absence from the ship.

The following is suggested as a basis per 100 rations:

Bread (hard or soft)	pounds..	100
Corned beef (canned)	do....	100
Coffee (roasted and ground)	do....	8
Sugar (granulated)	do....	15
Tomatoes (canned)	do....	100
Salt (table)	do....	2
Pepper (black)	ounces...	4

FIRE-FIGHTING EQUIPMENT

(1) Each boat crew shall be instructed in care and use of fire-fighting equipment provided for and installed in every power boat.

(2) In cases where a CO_2 system is provided, the cylinder should be disconnected and weighed at intervals of 3 months, and a record thereof should be kept on the cylinder-record card provided by the manufacturer. The card is to be kept in the "reminder file" in the first lieu-

tenant's office or, where no such office exists, in the ship's writer's office. When, upon being weighed, a CO_2 cylinder is found to have lost 10 per cent of its rated capacity, it must be refilled.

(3) Fire cannot exist in carbon dioxide due to lack of oxygen, the essential element of combustion. If diffused in air in sufficient quantities it will extinguish fire. A fire in such compartments as fireroom, motor-room, oil-pumping room, oil-control rooms, cargo spaces, storerooms, and engine-rooms of motor boats is best extinguished by diluting the atmosphere in the entire compartment by the introduction of carbon dioxide.

(4) To fight boat fires, carbon-dioxide portable hand and built-in types of extinguishers are installed and carried in the boats. The 2½-gallon portable foam and 1-quart carbon-tetrachloride extinguishers will be utilized until no longer serviceable and supplies on hand in store are exhausted before the portable 15-pound capacity hand carbon-dioxide extinguishers are placed in boats.

(5) These extinguishers shall be so located that at least half of them can be reached immediately regardless of the location of a fire. It is undesirable to locate them in the engine-room which is the most likely fire zone unless they can be operated from outside the engine compartment.

(6) When a carbon-tetrachloride extinguisher is used on a fire in confined spaces, the fumes of decomposition have a dangerous suffocating effect which must be guarded against. Use of carbon tetrachloride on hot metal should be prohibited.

(7) In boats equipped with permanent CO_2 fire-extinguishing apparatus, it is very important that the CO_2 flasks always have sufficient gas in them to function properly.

It must be borne in mind that if a CO_2 bottle is partially discharged, it should be immediately refilled and a new disc fitted. It is a liquid under high compression while in the bottle and it will continue to escape and gasify after the disc is cut and thus become empty and ineffective.

(8) The chemicals in the foam-type extinguisher begin congealing at temperatures below 40° F. In cold weather suitable precautions should be taken to protect this type of extinguisher. All types of fire extinguishers shall be tested as prescribed in the *Construction and Repair Manual.*

STOWAGE OF BOATS

Boats must habitually be stowed in accordance with the boat stowage plans for the particular ship. If changes are desirable for any reason,

the first lieutenant must be consulted. To avoid the possibility of damage to the boat or personnel in hoisting and stowing and securing boats for sea, the boatswain's mate should assure himself that the work is done according to the plan by personal supervision.

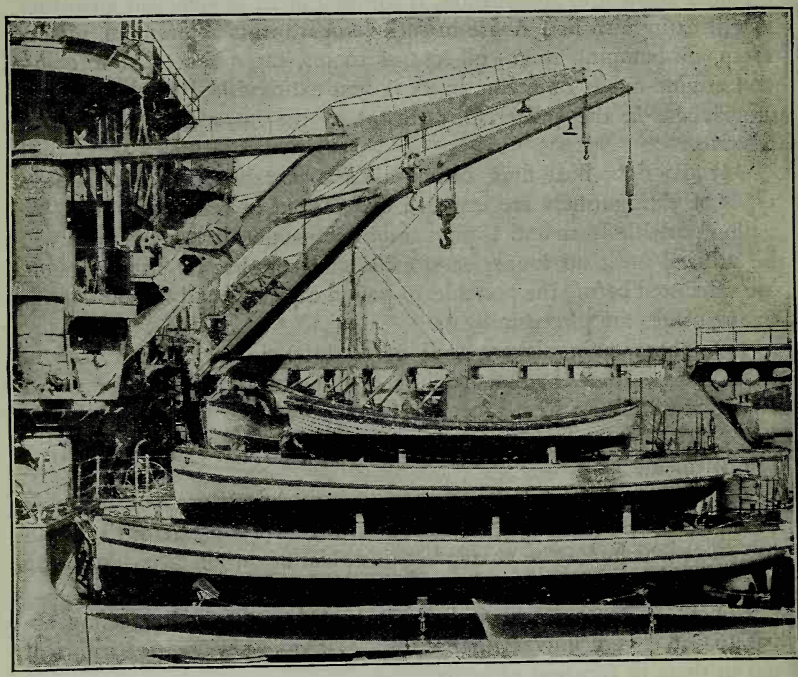


FIG. 32-1—Battleship boat stowage. These boats are not secured for sea.

BOAT SALUTES

Salutes shall be exchanged between boats meeting or passing each other, as indicated below. The junior shall always salute first, and the senior shall return the salute with the hand.

In boats fitted with swivel rowlocks, oars shall be trailed instead of being tossed. In such boats, the oars shall always be secured by trailing lines.

In power boats, engines are to be stopped in all cases in which pulling boats toss, trail, or lay on oars.

In laden boats, towing boats, or boats under sail, make the hand salute only on all occasions.

Officers not having their distinctive flag or pennant flying will receive the hand salute only, whether they are in uniform or civilian clothes.

Coxswains in charge of boats, if not already standing, rise and salute when officers enter or leave their boats; also, when their boats are saluting commissioned officers in other boats or returning a salute from them; but when steering a loaded or towing boat or a boat under sail they shall not rise, but shall salute with the hand only.

Enlisted men who are passengers in the stern sheets of a boat shall always rise and salute when a commissioned officer enters or leaves the boat.

Juniors always get into a boat ahead of, and leave it after, their seniors, unless the senior officer in the boat gives orders to the contrary.

As a general rule the seniors take the seats farthest aft; juniors shall leave such seats for their seniors.

At morning or *evening colors* boats passing near a United States naval vessel, or when lying off a foreign man-of-war, shall salute as follows: *Pulling boats, by laying on oars,* and *power boats, by stopping engines.* Coxswains of the boats shall stand at attention and salute and members of a power boat's crew outside of the canopy shall stand facing toward the colors and salute.

When a power boat salutes another boat in passing, or when it passes a ship that parades a guard or otherwise salutes an officer in the boat, the members of the crew outside the canopy shall stand at attention facing the boat or vessel.

Similarly, if the boat is carrying an officer for whom a salute is being fired, men outside the canopy shall stand at attention facing the saluting ship. The engines are stopped at the first gun and the boat headed up parallel to the saluting ship.

Boat keepers and all other men in boats that are not under way, *i.e.,* at the boom or at a landing, and not carrying an officer, shall stand and salute when an officer comes alongside, leaves the side, or passes near them and shall remain standing until the boat passes or reaches the ship's side. If boat awnings are spread, they shall sit at attention and salute with the hand without rising.

Men working on the ship's side do not salute, but continue their work, except when the bugle sounds the call *Attention.*

Salutes shall be extended to *foreign military or naval officers, or officers of our own Army, Marine Corps, Naval Reserve, Naval Militia,* or *Coast Guard,* in the same manner as to United States naval officers of corresponding rank. This rule applies alike afloat and ashore.

No junior shall ever pass a senior in a boat going in the same direction without first obtaining permission to do so.

The position of attention in a boat is sitting erect on thwart or in stern sheets.

At landing places officers are saluted by the crew of a pulling boat sitting at attention and by the coxswain rising and saluting with the hand.

Enlisted men who are passengers in running boats which contain officers shall maintain silence.

Boats at landings shall always show deference and respect to boats of other ships of our own or a foreign service. Coxswains shall remember that landings are for the use of all, that they should exercise patience and forbearance in awaiting their turn to go alongside, and when alongside they shall give way for other boats as soon as possible.

In such cases, boats carrying seniors should be given the opportunity to land first, and officers shall be saluted and in every way treated with the deference and respect due their rank.

It should be remembered that boats at a landing come more intimately into contact with officers and men from other ships than at any other place; therefore a strict observance of all courtesies by a boat crew will reflect credit upon the ship. If a doubt exists about the rank of an officer in a boat, it is preferable to salute rather than risk neglecting to salute one who is entitled to that courtesy.

Boats are not to lie alongside a gangway or landing place, but are to lie off while waiting. In case a long wait is probable, in bad weather, or at night, permission may be asked to make fast to a boom, also for the crew to come on board.

Small gear should not be left in boats which remain at the booms after sunset, as otherwise it may be stolen by passing shore boats.

When a visiting party goes alongside, the petty officer in charge thereof shall go on board and obtain permission before allowing any of the visiting party to leave the boat. If permission is granted, he allows the party to come on board, each one saluting, if colors are hoisted, as he crosses the gangway. If the boat is to wait, it shoves off and lies off the quarter, as above mentioned, unless the officer of the deck gives permission for it to haul out to the boom. The regular crew will remain in the boat unless the officer of the deck gives it permission to come on board.

Except when there is a special countersign, the answering hail from a boat in reply to a ship's hail shall be varied according to the senior officer or official who may be in the boat, as follows:

President of the United States	United States.
Secretary or Assistant Secretary of the Navy	Navy.
Flag officer in chief command	Fleet.
Chief of staff (when not in command of a ship)	Staff.
Force commander	Force (giving name of force).
Squadron commander	Squadron (giving name of squadron).
Division commander	Division (giving number of division).
Marine officer commanding a brigade	Brigade commander.
Commanding officer	Name of the ship under his command.
Marine officer commanding a regiment	Regimental commander.
Other commissioned officers	Aye, aye.
Other officers	No, no.
Enlisted men and marines	Hello.
Boats not intended to go alongside regardless of rank of passengers	Passing.

Boat ensigns are not to be used for boats to which they do not belong, and the insignia on the head of the pennant staff and flagstaff shall be as prescribed for the rank of the officer to which it belongs. The insignia on the head of the pennant staff and flagstaff are identical and are as follows:

President	Spread eagle.
Secretary and Assistant Secretary of the Navy	Gilt lance head.
Cabinet officers	Halberd
Flag officer	Halberd
Captain	Gilt ball.
Commander	Gilt star.
Lower rank	Flat truck.

Between sunset and sunrise flagships display two white lights in a horizontal line 6 feet apart and about halfway up the after side of the mainmast. When the flag officer is absent these lights are not shown.

DUTIES OF A BOAT KEEPER; SALUTES REQUIRED

(1) Boat keepers are detailed by the coxswain of the boat, two men being assigned for one day in order that they may relieve each other.

(2) Both assist in cleaning their boat during the morning watch. Boats must be in all respects ready for use by 0800.

(3) After 0800 the uniform for them is clean uniform of the day.

(4) One of them is always to be in his boat from morning colors to sunset when she is at the boom, unless ordered by the officer of the

Boat Salutes

Rank or rate of senior in saluting boat.	Rank of senior in boat to be saluted			
	Flag or general officer with flag flying.	Commanding Officer or chief of staff, above rank of lieutenant, or unit commander, with pennant flying.	Other Commissioned officer.	Midshipman or warrant officer.
Flag or general officer	Junior salutes first	.....	.....	
Commanding Officer or chief of staff above rank of Lieutenant, or unit commander, with flag or pennant flying.	Slows engine and disengages clutch or comes to "Oars," salutes.	Junior salutes first	.....	
Other Commissioned officers.	Slows engine and disengages clutch, or tosses or trails oars, salutes.	Slows engine and disengages clutch, or comes to "Oars," and salutes when meeting a senior with pennant flying.	Junior salutes first	
Midshipmen or warrant officer.	Slows engine and disengages clutch, or tosses or trails oars, salutes.	Slows engine and disengages clutch, or comes to "Oars," and salutes.	Salutes	Junior salutes first
Boat officer or coxswain of heavily loaded or towed boat or boat under sail.	Salutes	Salutes	Junior salutes first	
Coxswain	Slows engine and disengages clutch, tosses or trails oars, salutes.	Slows engine and disengages clutch, or comes to "Oars," salutes.	Salutes	Salutes

deck to come on board on account of bad weather. If ordered in on this account, he will remain on deck in sight of his boat, and watch and tend it from that position.

(5) They should be careful that the oars and other gear in their boats are always neatly placed. They shall wipe out their boats and touch up the bright work as often as necessary and shall be responsible for the general neatness and protection from damage of their boats and equipment.

(6) When not working in the boat, they shall always sit up and shall never lounge or read.

(7) When boat awnings are not spread, they are to stand up and salute all officers who pass near their boats.

(8) If awnings are spread, they shall sit erect and salute. If outside the canopy of a motor boat, they stand and salute.

(9) When more than one boat is at the boom, boat keepers shall salute together.

(10) At morning or evening colors, they stand and face the ship's colors and salute as if on deck. If boat awnings are spread, they will be furled at "first call" before sunset.

(11) The rules regarding salutes extended by boat keepers apply to all men in boats at the boom, or riding astern. All men in such boats salute together.

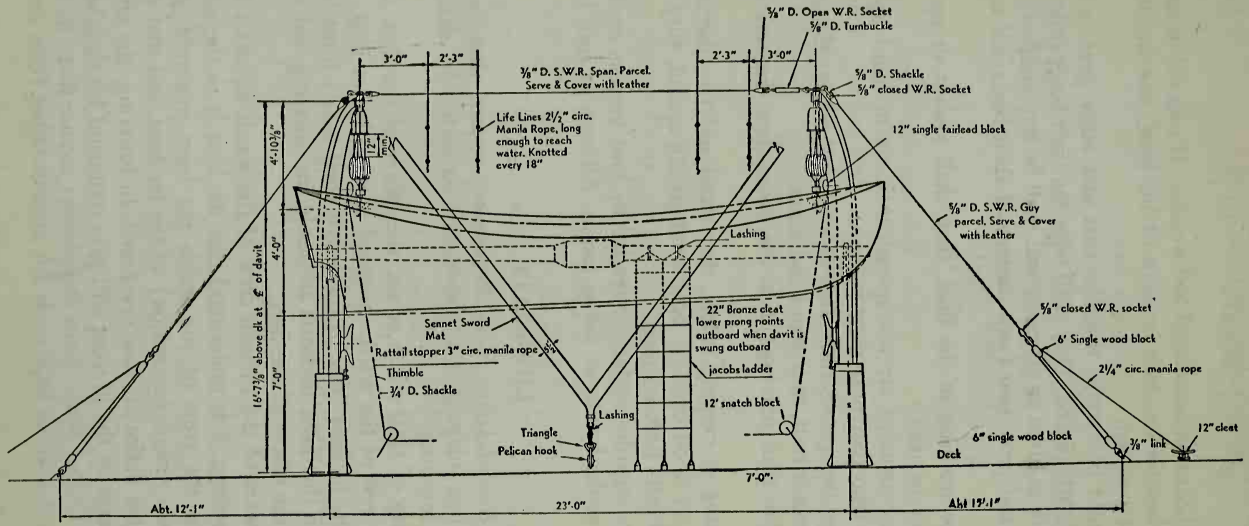
LIFEBOATS

At sea.—The *United States Navy Regulations* require that "when at sea, the boats best adapted as lifeboats, one on each side, shall be always ready for lowering."

At the beginning of each watch at sea, the officer of the deck shall have the lifeboat crew of the watch mustered abreast the lee boat, and the coxswain of the lifeboat crew of the watch shall satisfy himself by personal inspection that both lifeboats are ready for lowering and shall report the fact to the officer of the deck.

When the coxswain of the lifeboat crew of the watch reports a lifeboat ready for lowering, it is understood that the boat is in the above condition and that the crew of the watch has been mustered, each man abreast his own thwart (or station) of the lee boat, and that each man understands his duties at *Man overboard*. In lowering, the officer or coxswain in charge of the lifeboat will give command for detaching.

In Port.—The *United States Navy Regulations* require that "in port one or both lifeboats shall be kept ready for immediate use from sunset



ELEVATION

FIG. 32-2—Lifeboat at davits.

until 8:00 A.M." Hence when there is no suitable boat in the water ready for immediate use as a lifeboat, at least one boat suitable for this purpose must be kept ready for instant lowering. This is particularly necessary when the boats in the water are heavy and unwieldy or are so secured that they could not be quickly used in an emergency or in rough water or in a strong tideway.

Owing to its handiness, a dinghy is well suited for use as a lifeboat in port in good weather, and under such conditions it may be designated as the lifeboat for port service. The boats designated for use as lifeboats in port are required to carry only the usual equipment for boats in port, but the gear must be in order and ready for instant use, and the lantern must be ready in the boat for lighting, or else a lighted lantern ready for use must be kept at hand on deck.

Definitions of terms used with lifeboats.—

Crutch.—Special type of rowlock for a steering oar.

Falls.—The lines to which power is applied for hoisting. Whaleboat falls are rove with one continuous line.

Frap.—To pass lines around to support or steady. Particularly in lifeboats, to pass a line around the falls from deck to lessen the swinging of the boat while it is being lowered or hoisted. The line used for this is called a frapping line.

Gripes.—Articles for holding a boat steady in one position. Lifeboat gripes are bellybands made of lined canvas bands.

Lanyards.—Pieces of small line, used for securing.

Life lines.—Lines to prevent men falling overboard. Pertaining to lifeboats, they are knotted lines suspended from the span to each thwart. They are secured around the span by a thimble and may be moved fore and aft along it.

Lizards.—Sections of rope with a thimble fitted at one end. They are used as a leader and for steadying, by passing rigging through the thimble and hauling on the line as necessary. They are sometimes used in the middle of lifeboats' falls to take out the slack or on a jackstay for steadying.

Sea painter.—A bow painter which leads well forward of the bow of the lifeboat and outboard of all rail stanchions, etc.

Span.—A steadying line rigged between the forward and after davit heads. A span gages the distance between davits, when taut, and permits the swing of the forward one to be controlled by guys on the after one and vice versa.

Strongback.—A spar which is lashed between davits at their upper

bend. The lifeboat is griped in against it, when secured for sea. A pudding (circular canvas fender stuffed with small line, etc.) is usually built around it in the middle. (See Fig. 32-2.)

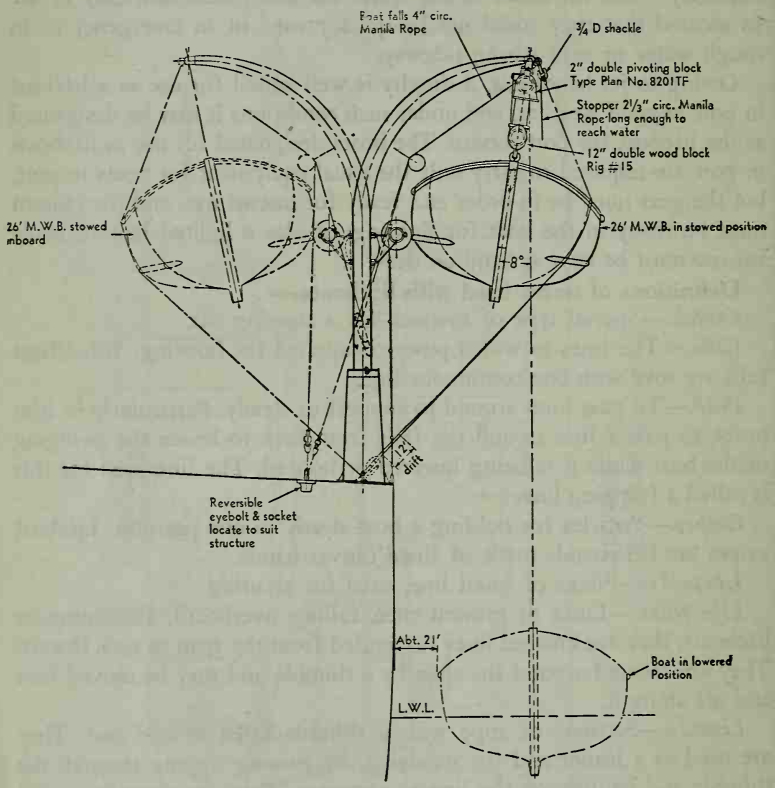


FIG. 32-2—Lifeboat at davits.

Toggle.—A short pin or rod inserted in a line so that a loop may be hooked over it to secure another line or to secure it on itself after taking a turn around something. The loop is fastened on it like a buttonhole on a button. There is a toggle toward the outboard end of the sea

painter to allow it to be fastened or released quickly. Toggles are also used to furnish hand holds for hauling, as on the drags of a hand-drawn fire engine or artillery piece.

General.—The pulling whaleboat and the motor whaleboat are ordinarily used as lifeboats. Lifeboats are stowed on deck or on skids and handled by a crane whip or are carried at the davits and lowered by means of the davit falls. Pulling whaleboats, used as lifeboats, are generally handled by davits as it is considered hazardous to lift out a pulling lifeboat fully manned by means of the crane.

Boat handling and stowage.—A lifeboat is secured for sea, *i.e.*, ready for lowering, when in the following condition: Boat at the davits, griped in, falls clear, detaching apparatus ready for detaching at the word, plug in, sea painter half hitched around second thwart and secured with a toggle, knotted life lines bent to span, and life jackets (one for each member of boat crew) stowed in a locker adjacent to the lifeboat so that the crew may don them before manning the boat. If this is not practicable, life jackets will be secured in place, one under each position in the boat occupied when the boat is lowered. All other articles of boat equipment shall be in the boat and ready for use, with two days' water and provisions for the crew. In the pulling lifeboat, the steering oar will be shipped in crutch, oars fitted with trailing lines and ready for getting out quickly, rowlocks shipped and fitted with lanyards, and lantern filled and trimmed (and at night lighted).

The motor whaleboats, when used as lifeboats, are secured for sea when in the following condition: Set up in chocks, griped down with gripes of 2½-inch Manila line with a quick-releasing pelican hook or toggle (pulling whaleboats' gripes upside down, *i.e.*, over the gunwales and secured to a pelican hook in the deck, is one method of securing), forward and after steadying lines rigged and coiled down clear of the deck, sea painter secured to a thwart, as in the pulling whaleboat, and led clear, fuel tank filled, lubricating oil reservoir full and reserve can of lubricating oil in boat, engine tested hourly, rations, life preservers, water, etc., as for the pulling whaleboat, in addition, the regulation fire-fighting equipment required for motor boats, the ring of the boat sling hooked on the single whip of the crane, tripping line to crane hook rove off and coiled clear on deck.

The tripping line is used to release the sling ring from the hook on the crane fall. It accomplishes this by means of the safety runner. This is a wire about 3½ fathoms long. One end of it is connected to the tip end of the hook. The wire runs down the hook through the sling ring

and then up and inboard to an eye where the tripping line is bent on. The tripping line goes from this eye to a block on the arm of the crane and thence down to the deck where it is belayed and coiled clear for running. When the boat is water borne, pulling the tripping line from deck straightens out the bight of the safety runner and lifts the sling from the hook.

Mustering lifeboat's crew.—At sea the lifeboat crew should be mustered at the beginning of each watch and at night each half hour on the bell. After muster, the crew must remain near the station and be ready to man the boat at a moment's notice. Men of the lifeboat's crew must remember that on them, and on how well they do their duty, depends the life of any of their shipmates who may fall overboard. It sometimes happens that members of the crew get careless, due to nothing happening, and leave their stations without proper authority. This is not only a neglect of duty of the worst kind, but also a criminal neglect, for it means the probable sacrifice of a shipmate's life in an emergency. Members of a lifeboat crew occupy a most important duty station, one demanding expert knowledge of every member of the crew, and one filled with grave dangers unless everyone does his duty correctly at the right time.

When a lifeboat crew is mustered, the men fall in abreast their boat (or the lee boat), facing inboard, in the order of their thwarts; the men stationed to lower muster at their respective davits, and will personally see that the falls are clear; the men detailed to observe the man and for signaling, etc., muster abaft the stroke oarsman.

Duties of members of crew at lowering.—As soon as the crew gets in the boat, all put on their life jackets and see that their oars and knotted life lines are clear and ready for use. The bowman tends the forward fall to keep it clear and unhooks it at the order from the officer or petty officer in charge of the boat. The *forward fall* must *never* be *unhooked until after the after fall* is unhooked. After unhooking, the bowman keeps the block clear of the rest of the crew until the boat is well clear.

Automatic releasing hook.—The standard boat-releasing gear used by the United States Navy is known commercially as the "Raymond" releasing gear. This gear consists simply of a special hook provided with a tripping device. The hook is made in two pivoted parts. The outer part, which forms the end of the hook, is so weighted that, when the boat is water borne, the point of the hook automatically "tumbles," releasing the boat. When the boat is not water borne, its weight prevents

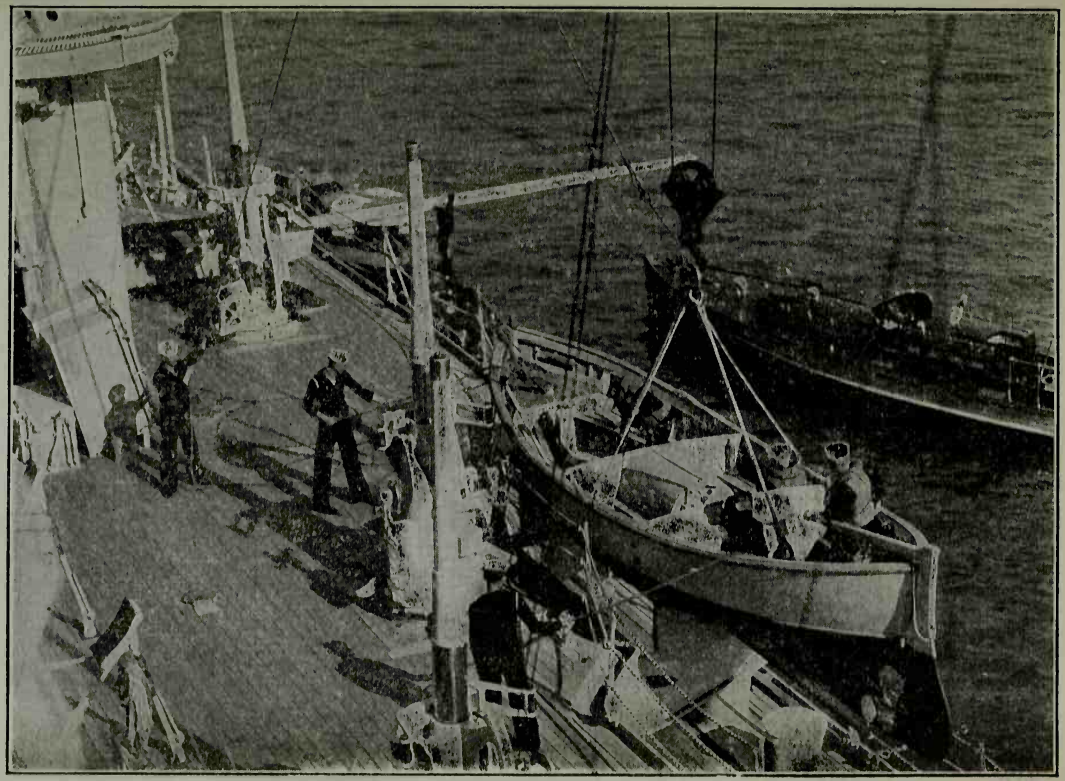


FIG. 32-3—Motor lifeboat, ready to lower.

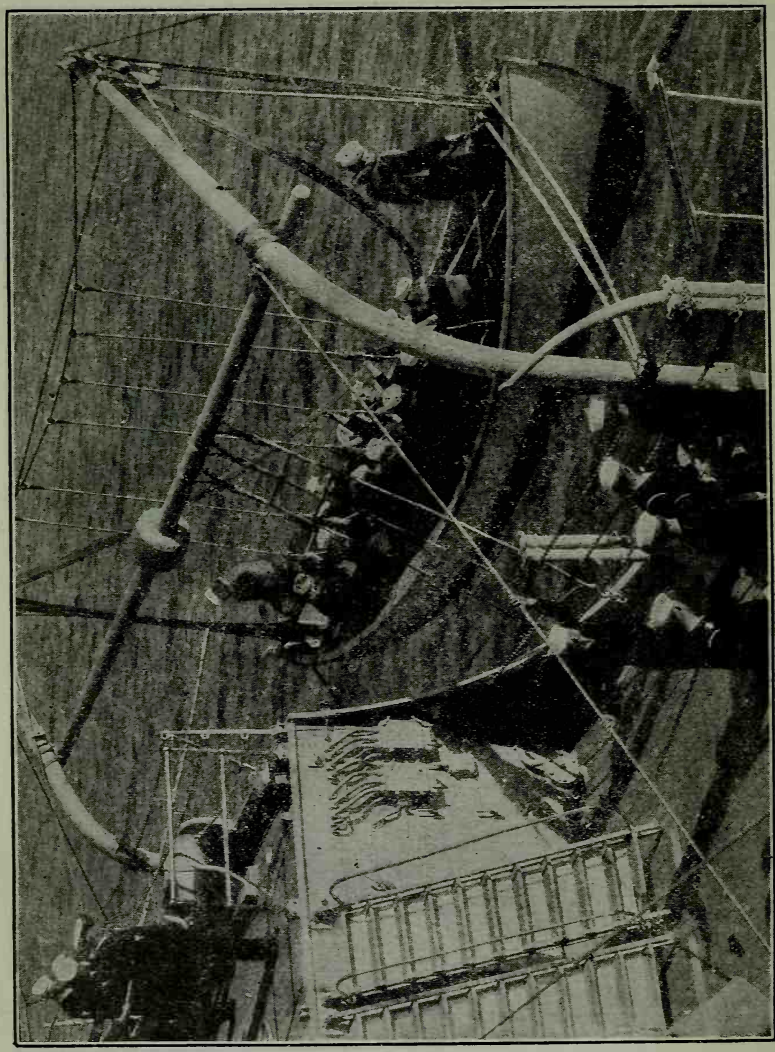


FIG. 32.4.—Lowering or hoisting, showing use of frapping lines

the "tumbling" of the hook. To facilitate attaching the hook to a waterborne boat, prior to hoisting, a lanyard, which is made fast to the end of the tripping device, is rove through the boat shackles.

Note.—In lowering, the forward hook should be prevented from releasing before the after hook is clear. This should be done by holding the point up by the lanyard on it.

The *second bowman* tends the sea painter. As soon as he gets to his station and has his life jacket on, he takes the sea painter, which is held by a toggle or half-hitched to the second thwart, and unfastens it. Leading it through the inboard bow rowlock, he takes in the slack and takes a turn round the inboard end of second thwart. He keeps the end in hand; it should never be made fast. The boat rides to the sea painter after unhooking and the coxswain sheers the bow out by throwing the stern in as the boat strikes the water. The second bowman lets go the sea painter on order from the officer or petty officer in charge of boat.

Stroke oar tends after fall in same manner as explained for bowman. *The after fall should always be unhooked first.* The stroke oar must be especially careful to keep his falls, after unhooking, clear of the coxswain, so that the coxswain will not be bothered with it. The most dangerous point in lowering is at the time of unhooking, when the boat may be smashed against the ship's side. The coxswain must be free at this time to use all his energies to get the boat away from the ship's side.

Other oarsmen see that all oars are clear for getting out. They must be especially careful that the oars are not foul of the lanyards. If the ship is rolling considerably, the waist oarsmen must keep the boat off the ship's side with boat hooks, being careful to keep the end that is toward the boat above the outer gunwale to avoid the danger that the boat will be driven against it and a hole stove in the boat's planking. As soon as the boat is clear of the ship's side, these thwartmen get out their oars.

Men stationed at falls, for lowering, will lower at the command of the officer of the deck or the officer or petty officer in charge of lowering. They must lower away together, keeping the boat on an even keel. When the boat is near the water, the officer or petty officer in charge of lowering will comand *Let go,* when both falls will be quickly thrown off the cleats. Men attending to falls must watch their own cleats carefully while lowering to prevent the falls from slipping off and dropping the boat.

Duties of members of crew on hoisting.—The boat is brought alongside abreast the davits close enough so that a heaving line attached to the sea painter can be hove aboard.

Bowman boats his oar and stands by to receive the sea painter. On receiving the sea painter, he takes a round turn on the inboard side of the second thwart and keeps the end in hand. At this point oars are boated and the second bowman takes the sea painter, while the bowman stands by to hook the forward fall. The boat is hauled up under the davits by men on deck manning the sea painter.

Waist oarsmen keep boat off the ship's side, using boat hooks if necessary.

Bowman hooks *forward fall first.*

Stroke then hooks after fall.

If ship has much way on, a line will be passed to the stern of the boat, which the second stroke will tend by taking a turn around the after thwart. This line will lead well aft on the ship and will prevent the boat from lurching forward as it leaves the water. After the boat leaves the water, and if their duties permit, all members of the lifeboat crew should take as much weight off the falls as possible by taking their weight up on their individual life lines.

Men not occupied should keep their life lines in hand while the boat is being lowered or hoisted.

If weather does not make it too dangerous, orders will probably be given for men who are not employed to leave the boat when it reaches deck height.

Orders and expressions used in hoisting.—

Avast!—Stop; as, *Avast heaving!*

Fore-in-hand.—To hold running rigging fast temporarily while it is being belayed. This is done to the falls to prevent the boat slipping back, by taking turns about them with a piece of line or binding them against the davits with the body and arms.

Handsomely.—Slowly and carefully, as Walk back *handsomely.*

Hoist away!—Commence hoisting.

Set taut!—Take out slack. This order is given before the order *Hoist away!*

Two blocks.—Against the upper block. All the way up. This is said of boats, flags, or any objects which are hoisted with block and tackle.

Up behind!—Slack up quickly by returning toward the boat. This order is used after *Walk back handsomely* and when ready to belay the falls.

Walk back!—Return toward the boat with falls in hand. This is usually used with "handsomely" to prevent losing control of the boat before the fore-in-handing has been tested.

Notes on lifeboats.—(1) Lifeboats should be griped securely against their strongbacks, with chafing pads between the boat and the strongbacks. The gripes should be secured to the davits, across the quarters of the boat, and be secured at the deck by toggle or pelican hook, ready for instant freeing.

(2) If gripes stretch and become slack, they should be set up taut.

(3) At night, boat falls should be coiled down on deck, clear for running; during the day, the coils may be triced up to davit with becket and toggle.

(4) Where Raymond automatic releasing hooks are fitted, falls should be rove continuous between davit heads.

(5) The sea painter is led from a point well forward on the ship, outside of everything, and secured to the inboard side of the second thwart in such a manner that it can be readily cast off; if necessary, it is stopped up out of the water by a rope yarn. (Fig. 32-5.)

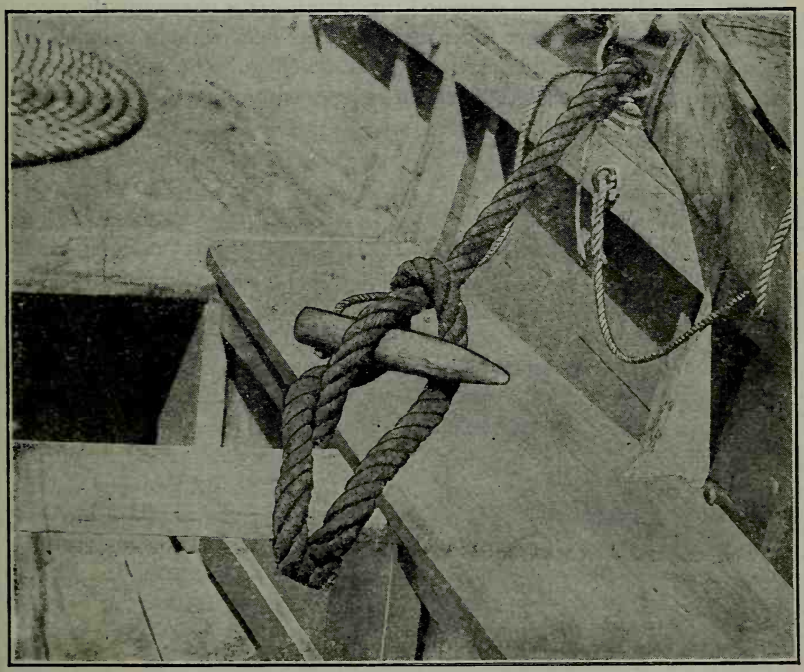


FIG. 32-5—Method of securing sea painter.

(6) The knotted life lines, one for each member of the crew, hang from the span for the use of the crew in case of accident in lowering or hoisting.

(7) The life jackets should be placed one under each thwart and one under the stern sheets and each man in the lifeboat shall put on one before the boat is lowered. This is necessary because of the danger of the boat swamping alongside in rough weather. All men must be cautioned when putting on the life jackets to make fast all the beckets.

(8) If the lantern is not provided with a shutter, it will be fitted with a canvas screen, and when lighted and not in use shall be put in the boat bucket.

(9) Lifeboat crews for each watch are designated on the ship's station bill.

(10) The proper members of the crew shall be permanently stationed for unhooking the falls, tending the sea painter, and for performing other duties in connection with lowering. The lifeboat crew of the watch, including the men stationed for lowering, for observing the man, for signaling, etc., are not to leave the weather deck without permission.

(11) At night the lifeboat crew of the watch and other men stationed in connection therewith shall remain near their stations.

CHAPTER 33

SAILS AND SAILING

Boat sails 339
Rigs of sailing ships 340
Rig of sail boats 340
Rigging 340
Definitions 343
Principles of sailing 346
Bending and sheeting sails 350
Trim 355
Tacking 356
Wearing 357
General precautionary notes 357
Rules of the road 361
Preparations prior to sailing 362
Boats under sail (drills) 362
Sailing races; general rules 378

BOAT SAILS

SAILS FOR standard Navy boats are made of cotton canvas, in accordance with plans issued by the Bureau of Ships. They are 4-sided fore-and-aft sails, except for 3-sided jibs.

To form a sail, strips of canvas in bolt widths are sewed together. In some cases the sails are sewed with the long seam parallel to the leech; in other cases the long seam is perpendicular to the leech. On the edges they are sewed to ropes called boltropes. Sails are usually strengthened by a triangular patch in each corner, and in the wake of the reef points by a canvas strip, or reef band.

Definitions.—The parts of a sail and its attachments are as follows:

Brails.—Lines led across a sail and attached at the outboard edge. They are used for drawing the sail in against the mast.

Clew.—Lower after corner.

Foot.—Lower edge.

Head.—Upper edge. In the case of a jib, it is the upper corner.

Leech.—After edge.

Luff.—Forward edge.

Peak.—Upper after corner.

Reef cringle.—A thimble attached to the boltrope on the forward and after edges and near the reef points. A line is run through the cringle to assist the reef points in holding a reef.

Reef earing.—A piece of line attached to the cringle.

Reef points.—Short pieces of line attached in a row across the sail.

Tack.—Lower forward corner.

Throat.—Upper forward corner. This is also called the nock. A jib has no throat.

RIGS OF SAILING SHIPS

Figure 33-1 shows the various types of rigs on sailing ships. The brigantine is the same as the brig, but without the square mainsail.

A ship is square-rigged on a certain mast when the sails on that mast are bent to yards, and fore-and-aft rigged when the sails are bent to gaffs.

Masts in 2-masted ships are named fore and main; in 3-masted ships, fore, main, and mizzen; in 4-masted ships, fore, main, mizzen and spanker; in 5-masted ships, fore, main, mizzen, jigger, and spanker.

RIG OF SAIL BOATS

Sailing ships carry numerous classes and types of sails. Our boats, however, use only foresails, mainsails, mizzens, and jibs.

In boats having two quadrilateral sails, the forward is the foresail and the after is the mainsail. In the case of the ketch rig, the forward sail is the mainsail and the after is the mizzensail or jigger. (In sailing ships the after sail is not, as a rule, the mainsail.) When there is only one quadrilateral sail, it is the mainsail. The jib is a triangular sail which is attached to a forestay. Larger sailing vessels may carry more than one jib, with a further identifying name as, flying jib, etc.

Types of rigs.—There are many types of sailing rigs in use, but only four are standard for standard Navy boats, namely,

Gaff and boom, or sloop and schooner, for motor launches.

Ketch, for whaleboats with centerboard.

Standing lug, for whaleboats.

Sprit, for dinghies.

The differences which identify them may be seen in Fig. 33-2. The dipping lug was used at one time and might still be seen.

RIGGING

Except in the sprit rig, the foot of the mainsail is lashed to a spar which is called the boom, and this is secured to the mast by an iron ring and a swivel joint, known as a gooseneck, or pacific iron.

In the gaff and boom and standing lug rigs, the head of each quadri-

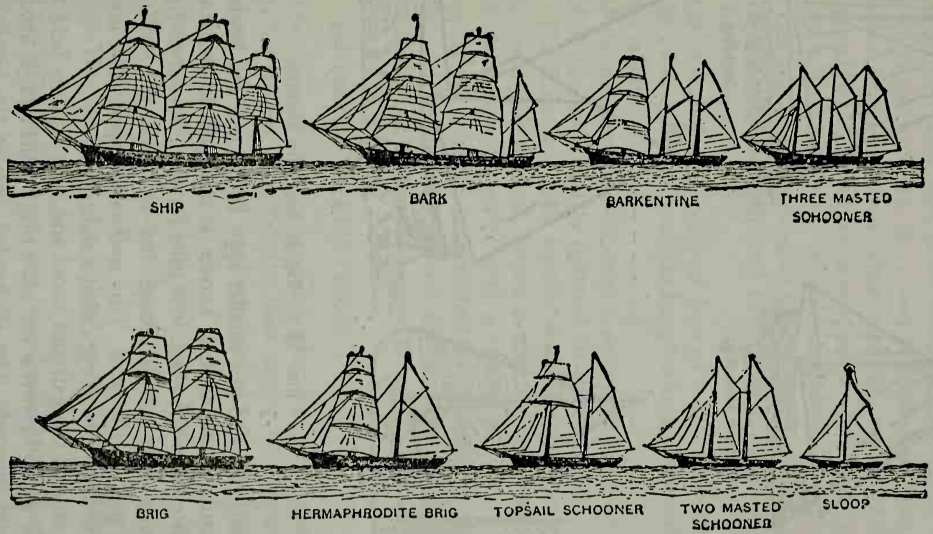


FIG. 33-1—Rigs of sailing vessels (courtesy of D. Van Nostrand Company, Inc.).

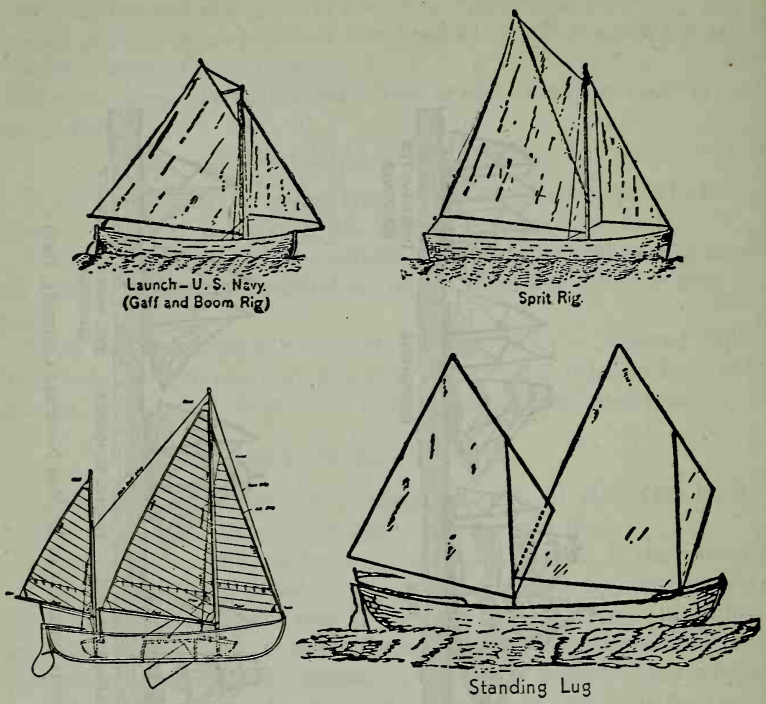


FIG. 33-2—Rig of boats for sailing.

lateral sail is lashed to a smaller spar. In the gaff and boom rig, this spar, which ends at the mast, is known as the gaff. In the standing lug rig, where it crosses the mast, it is called a yard. The sprit rig has a similar supporting spar which crosses the sail from the peak to the lower middle part of the mast. This spar is the sprit. The lower end of the sprit is held by a rope eye called a snotter.

The sails of the gaff and boom and sprit rigs are held to the mast by, and ride up and down it on, mast rings which are secured along the luff at regular intervals. The jib-headed sails in the ketch rig are held to the mast by slides which run in a track on the mast. The standing lug sails are not secured around the mast. Jibs usually slide up and down a jib stay on hanks. The jib stay may be secured to the stem head or to a bowsprit, a spar which projects beyond the bow of the boat. (The bow-

sprit on sailing ships is a heavy spar which is a permanent part of the ship. To it are attached lighter, projecting spars, which are the jib boom, flying jib boom, etc.)

Sails are hoisted by block and tackle arrangements, called halyards. Consequently, the lines to which the power is applied in hoisting have come to be known as the halyards. There may be peak halyards, throat halyards, jib halyards, etc. Sails may have a tackle which allows a downward pull to be exerted and this is called a *downhaul.*

The boom and foot may be elevated by the topping lift, a purchase attached to the boom by a bridle and having an upper block secured near the top of the mast.

The outward swing of the boom, or foot of a sail without a boom, is controlled by a line called a sheet. On boom sails this is usually rigged with block and tackle.

The heel of the mast rests on the step, a socket, or supporting framework, secured at the keel, and is fastened in it by a large cotter pin, the king-pin. The mast is usually further stayed by the *gate.* This is a hinged, semicircular, metal band, which is attached to a thwart and is closed around the mast and secured with a cotter pin.

Further support for the mast is furnished by standing rigging, which is known collectively as the shrouds and which leads to the side of the boat. The fore-and-aft supports are known as stays.

DEFINITIONS

Aback.—The sails are said to be *aback* when the wind presses their surface aft with a tendency to force the boat astern. This condition may be brought about when the boat has been headed into the wind, either in tacking or to avert capsizing.

About.—Changed from one tack to the other. You may *come about, go about,* or have the order *ready about* given.

Backstays.—Stays which lead aft.

Bare poles.—The condition of a sailing vessel when she has no sail set.

Bear up.—Up tiller (helm aweather), thus heading boat further away from the wind.

Beating to windward.—Sailing close-hauled, first on one tack and then on the other, thereby working gradually up in the direction from which the wind is blowing.

Belay.—To make fast. *Never belay a sheet while sailing.*

Bend.—To make fast. The sail is bent to a spar.

Bring to.—The act of stopping a boat by bringing her head up into the wind.

Broach to.—To slew around when running before the wind.

Cleat.—A device with two arms on which a line may be belayed.

Close-hauled; by the wind or *on the wind.*—Sailing a boat as close to the direction from which the wind blows as will gain the most distance to windward in a given time.

Douse.—To lower quickly, as *dousing* a sail.

Down.—Toward the lee side. It is used in connection with the tiller, which may be *put down* (up rudder), toward the lee side, or *up* (down rudder), toward the windward side. This wording was derived from the fact that a sailing vessel practically always lists away from the wind; therefore, the lee side is really down and the weather side up.

Downhaul.—A tackle to exert a downward pull on a sail.

Draw.—The sails are said to be *drawing* when they are filled with wind so as to give the boat headway.

Ease off.—To slack away a line. To head off from the wind.

Free: sailing free; off the wind.—Sailing with the sheets eased, on the desired course, without being close-hauled.

Full and by.—With the sails as close to the wind as possible and yet filled with wind. This occurs when close-hauled.

Furl.—To roll up snugly and secure, as a sail or awning.

Gate.—A hinged, semicircular, metal band attached to a thwart to help stay a mast.

Gybe.—A sail is *gybed* when, in turning a boat's head away from the wind, the sail is allowed to swing from one side to the other; the wind being aft or nearly so, and the sail full, first on one side and then on the other.

Hauled flat.—The condition of the sails when they are almost fore and aft, but still drawing.

Heave to.—To put a vessel in the position of being stopped, but ready to proceed. Either power or sailing boats may do this.

In irons.—Caught by the wind so that a turn cannot be made in either direction.

Jury mast.—A temporary mast rigged in place of one lost or broken.

Lee side.—The side away from the wind.

Lee shore.—A shore onto which the wind is blowing. Dangerous.

Leeward.—The direction toward which the wind is blowing; away from the wind.

Leeway.—The lateral movement of a ship to leeward of her course, owing to the side thrust of the wind.

Lie to.—To remain in practically the same position without anchoring. This may be done in a sailing vessel by *dousing sail, reducing sail,* or *heaving to.*

Loose sail.—Unfurl sail and prepare for use.

Luff (verb).—To turn the boat's head into the wind as if to go about causing the luff of the sail to shake. This should be done when a gust of wind heels the boat over and threatens to capsize her. When the tiller is put down and the boat heads up, the sails spill their wind, the heeling effect from them is lessened, and the danger of capsizing is temporarily averted. The sails should not be spilled completely but just enough so that the luff begins to shake.

Miss stays.—To fail to get about when an attempt is made.

Pay off.—To fall off from wind; said of the head of a sailing vessel. To *pay off,* or preferably, to *pay out,* is also used to define the act of slacking line or sheet, so that it may be free to run, but without letting go.

Port tack.—When sailing with the wind coming over the port side.

Reach.—A course that can be made good sailing off the wind. A straight run between bends in a river or canal.

Reef (verb).—To reduce the area of a sail when the wind is too strong to carry the whole sail. This is done to avert danger of capsizing or damage to sail or mast. The reef points are always passed under the foot of the sail, never around the boom.

Reeve (verb).—To lead a rope through the proper fair-lead. Example: "Reeve the halyards through a sheave in the masthead, and lead down to a cleat on the mast."

Run.—A course that can be made good sailing before the wind.

Running before the wind.—Sailing free and with the wind abaft the beam.

Running rigging.—Those ropes which reeve or lead through blocks or fair-leads, such as halyards, sheets, etc., by which the sails are controlled.

Sheet.—A rope or tackle made fast to the clew of a sail or boom and used to control the angle the sail makes with the wind.

Shorten sail.—To lessen or to *douse* sail; usually used as a command to take down sails.

Slack.—To lessen tension on a rope by letting it run out.

Standing rigging.—Those ropes which are stationary, and seldom require alterations, such as shrouds and stays.

Starboard tack.—When sailing with the wind coming over the starboard side.

Sternboard.—The motion of a vessel in a direction opposite to ahead. We say that a boat acquired *sternboard,* or more usually, *sternway.*

Strike.—To shorten or douse; to *strike* sail.

Tack (verb).—To go about. Tiller down (helm alee) causing the boat's head to swing through the wind, and the sails to fill on the opposite side.

Tack (noun).—One leg of the zigzag course steered in beating to windward.

Trim.—The difference in draft, forward and aft.

Wear (verb).—Tiller up (helm aweather) so that the boat's head falls off from the wind, sails gybe, and the boat comes by the wind on the other tack. Opposite of *tack;* in wearing the boat's stern passes through the direction from which the wind comes, while in tacking the bow passes through the wind.

Weather (verb).—In sailing, to pass to windward of another boat or object. It also means successfully to ride out a squall or storm.

Weather side.—The side toward the wind; opposite of lee side.

Wing and wing.—With sails out on both sides. This is done in sailing right before the wind, and an oar or spar may even be used to extend the foot of a boomless sail if the breeze is not too strong.

Yaw.—To veer suddenly and unintentionally off the course.

PRINCIPLES OF SAILING

Sails can be used to best advantage in the practical handling of a boat, if one has a general understanding of the theoretical principles of how sails apply the force of the wind in the direction of the keel line from aft, thereby driving the boat forward.

Consider the wind as blowing normal to the plate in Fig. 33-3. The wind simply pushes on the plate, driving it in the direction of the wind.

Now consider the wind blowing on the plate at an angle as in Fig. 33-4. Let the length of the arrow represent the scale of the force of the wind. Then the force of the wind may be resolved into two components, N normal to the plate and A along the face of the plate. Force component N tends to push the plate in the direction N, whereas A goes harmlessly off the edge of the plate.

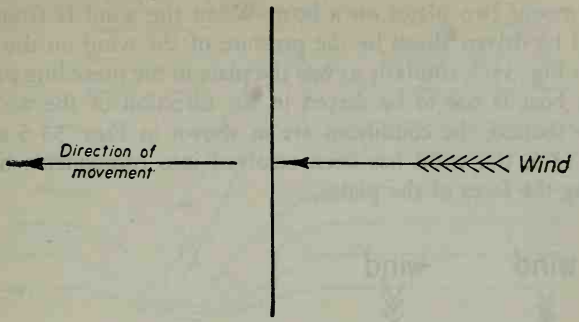


FIG. 33-3.

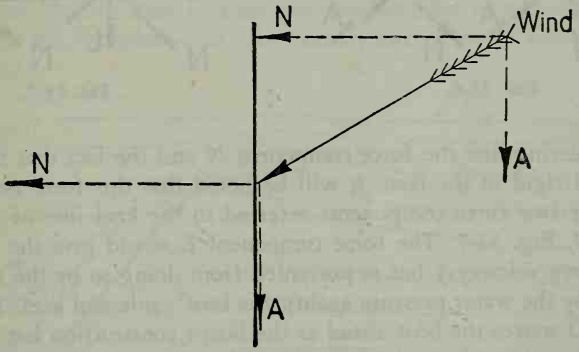


FIG. 33-4.

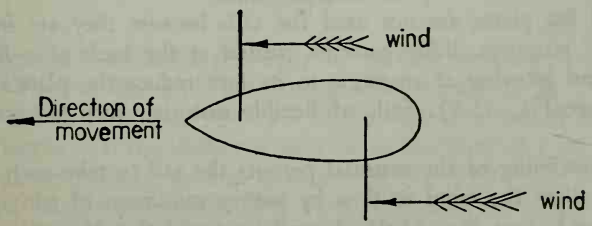


FIG. 33-5.

Next mount two plates on a boat. When the wind is from aft, the boat will be driven ahead by the pressure of the wind on the plates as shown in Fig. 33-5, similarly as was the plate in the preceding paragraph.

If the boat is not to be driven in the direction of the wind but at an angle thereto, the conditions are as shown in Figs. 33-6 and 33-7. In Fig. 33-6, the wind has been resolved into components normal to and along the faces of the plates.

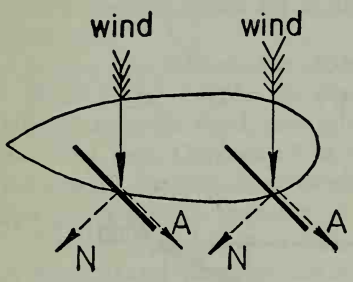


FIG. 33-6.

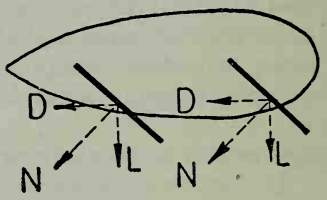


FIG. 33-7.

Considering first the force component *N* and the fact that the plates are fixed rigid in the boat, it will be noted that this force component has itself two force components referred to the keel line of the boat, *L* and *D*, Fig. 33-7. The force component *L* would give the boat leeway (move sideways) but is prevented from doing so by the resistance offered by the water pressure against the boat's side and keel. The component *D* moves the boat ahead as the boat's construction has been designed to reduce the resistance offered by the water in this direction. The force component *A* blowing along the face of the plate exerts no force to drive the boat. It does, however, play an important part in the efficiency of sails, as will be described later.

Rigid flat plates are not used for sails because they are inefficient for such purposes. Eddy currents created at the back of a flat plate in a wind blowing at an angle to its face reduce the plate's driving force (see Fig. 33-8). Sails of flexible material, such as canvas, are used.

The flexibility of the material permits the sail to take such a shape as will allow the wind to flow by with a minimum of eddy currents at the back (see Fig. 33-9). It will be noted that the sail takes the

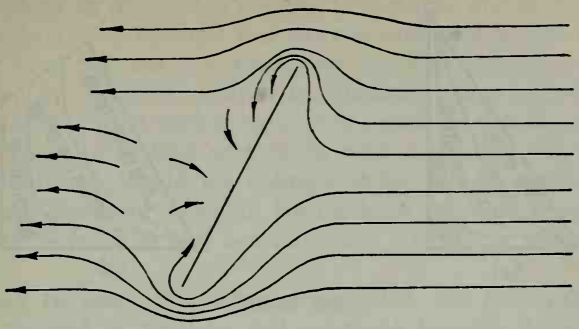


FIG. 33-8.

general shape adopted for aircraft wings. It has been found that just as the top of an aircraft wing gives the greater part of the lift to an airplane, so does the back of a sail provide the drive to a boat. It is the back of the sail, therefore, that is of primary interest to the one in charge of the boat.

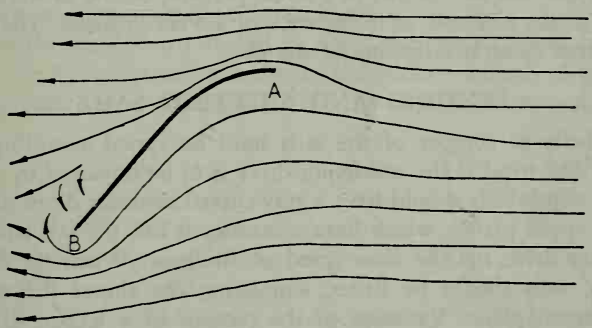


FIG. 33-9.

Experiments have shown that eddy currents on the back of a sail reduce the drive of the sail. There are no eddy currents at *A*. The eddy currents shown at *B*, Fig. 33-9, are unavoidable and cannot be eliminated. They exist at the leeches of sails, hence the drive of a sail relative to the various parts of its area is shown by Fig. 33-10 (*a*) and (*b*). When the mast is placed at *A*, Fig. 33-9, the luff of the sail, eddy currents are created on the back of the sail by the mast in the *much*

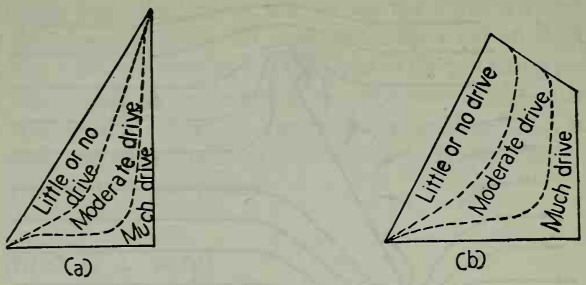


FIG. 33-10.

drive section. If not eleminated, they greatly reduce the drive of the sail. They are eliminated by the use of a foresail or jib. The air spilling from the leech of the foresail or jib, force component *A* (Fig. 33-6), sweeps the eddy currents away and restores the drive of the mainsail. The jib also increases the drive of the mainsail in another way. The increased velocity of the wind passing through the narrow opening between the two sails results in a lower pressure on the forward side of the luff of the mainsail, as in the neck of a Venturi meter. The effect is accentuated by an overlapping of the jib.

BENDING AND SHEETING SAILS

The belly or contour of the sails must be varied according to the force of the wind if the maximum drive is to be imparted to the boat. In light winds sails should have a very curved contour. As in the wings of slow speed planes, which have a maximum lift, the sail will have a maximum drive for the slow speed of the boat. When the breeze is stronger, sails should be flatter, simulating the almost flat wings of a high-speed plane. Variation of the contour of a rectangular sail is accomplished by giving the head and foot of the sail a slight fullness on hauling them taut when bending them to the gaff and boom. In the same manner is a jib-headed sail varied except that the length of the leech must be adjusted by shifting the bending of the halyard in the head block. When the foot of such a sail is hauled taut on the boom, the leech must be lengthened and vice versa. In order that the contour may be varied with greater ease sails should be bent to gaffs and booms by the use of racks and runners. When the sail is being bent to a spar, great care must be taken not to spoil the shape of the sail by introducing hard spots or twists, wrinkles, and curling the leech.

The breaking in of a sail is important. It should first be bent with a moderate strain on outhauls and halyards and used in this manner until hard spots have stretched themselves out. The strain on boltropes should then be increased carefully to eliminate wrinkles, and thereafter the sail set in the same manner. It is important that the point of maximum curvature be kept close to the mast or the boat will not sail well to windward. Should the boltrope at the luff be overstretched, not only will this point move aft, but the leech will tend to curl. Too much strain on boom or gaff outhaul creates a hard spot at the throat or tack.

It should be noted that when close-hauled, the *little drive* area parallels the keel of the boat and exerts no forward thrust. Thus, again, most of the forward thrust comes from the *much drive* area. Should the *little drive* area curl or be sheeted past the parallel of the keel, it will act as a drag.

Sails are sheeted to meet four general conditions:

(*a*) On the wind.
(*b*) Off the wind.
(*c*) Running before the wind.
(*d*) Give maximum drive to the mainsail.

(*a*) *On the wind.*—(1) It will be noted that with a given force of the wind, the flatter the sails are sheeted the smaller is the *D* component and the greater the *L* component (Fig. 33-11). In other words, the

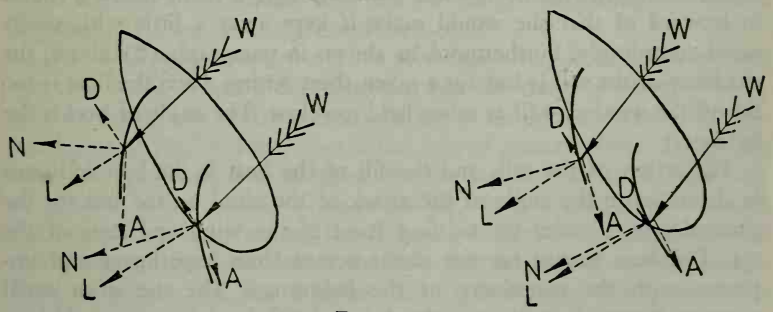


FIG. 33-11.

boat remaining on a course, the flatter the sails are sheeted the greater will be the tendency of the boat to drift to leeward under the increased force of *L* than it will be to move ahead under the reduced force of *D*.

(2) When the sails have been set, it will be noted that the higher the boat is pointed into the wind the more are the driving force *D* and the leeway force *L* reduced (Fig. 33-12).

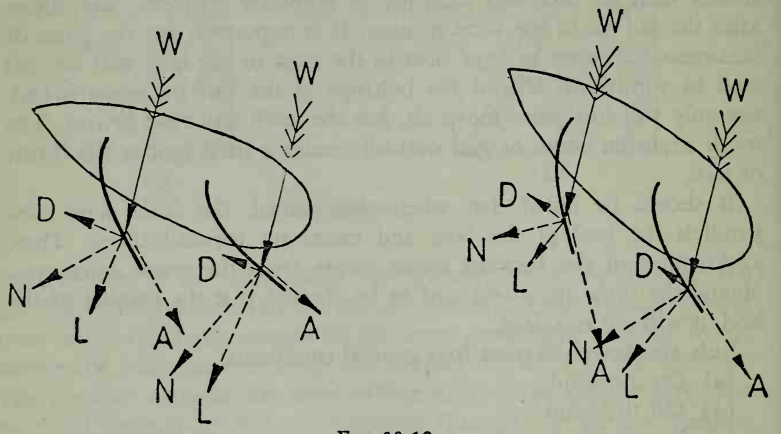


FIG. 33-12.

(3) Considering the above principles, the general rule for sailing on the wind is to keep the sails well full, sheets not too flat, but every one drawing and the boat alive. It is a common mistake to get the sheets so flat that the boat, while pointing high, actually makes a course to leeward of that she would make if kept away a little with sheets eased accordingly. Furthermore, as shown in paragraph (2) above, the efficiency of the sail is lost for a given sheet setting when the boat is too far off the wind as well as when held too close. The angle of heel is the indicator.

The action of the sails and the fill of the boat is the best indicator in determining the angle of the attack of the wind on the sail for the particular boat under the existing force of the wind and state of the sea. The best setting for the sheets comes from experiment and improves with the experience of the helmsman. The use of a small pennant mounted on the masthead is helpful in determining changes in wind direction. The relative angle that the pennant makes with the wake of the boat is somewhat of an indication of how the boat is pointing and can be used to advantage by beginners. Using fixed objects as ranges to check the course made good is a valuable aid in getting the most out of a set of sails. It must be constantly borne in

mind that radical changes in the amount of the sheet are neither necessary nor desirable to improve conditions when pointing on a course. The sheet must be tended with the greater delicacy for the best results. A boat must never be pointed so high that the luff of any sail flutters (the warning that eddy currents exist behind the sail and the area of greatest drive). When this occurs the drive from that part of the sail is being lost.

(*b*) *Off the wind.*—When sailing off the wind the boat is headed so that the wake lies along the course it is desired to make good and the sails sheeted accordingly. The general rule is to ease off the sheets in order that the component *D* may be a maximum. This is accomplished practically by easing off the sheets until the luff of the mainsail quivers (not from the spill of the jib) and then to sheet in until the quivering stops.

(*c*) *Running before the wind.*—When running before the wind the sail should be as nearly as possible at a 90-degree angle to the keel to prevent side thrust and loss of energy by moving the boat sideways through the water. However, very little will be lost in sheeting in the sails just sufficiently to clear the stays or shrouds. It is sometimes desirable to set the foresail or jib on the side opposite to the mainsail and thereby increase the drive area. A temporary boom is rigged by using a boat hook or oar. A boat sailing in this way is going *wing and wing*. The concern of one in charge of a boat running before the wind is not the set of the sails but the danger of gybing or perhaps capsizing. This subject is discussed later.

(*d*) *Give maximum drive to the mainsail.*—(1) It has been pointed out that a sail is not a flat plate but has the curve of the top of an airplane wing, and that the area adjacent to the luff and along the forward part of the head and foot is the area of greatest drive. To get the most out of a boat, it is essential that the sail be bent so that the area of greatest drive is free from wrinkles which create eddy currents. Furthermore, when sheeting the mainsail, it is not the angle between the boom and the keel line of the boat that establishes the component *D*, drive of the sail, but is rather the angle between that part of the sail having the greatest drive (just aft of the luff) and the keel line. The angle must never be such that this part of the sail quivers from eddy currents on the back surface.

(2) It has been stated herein that the spill of the foresail or jib tends, when properly set, to smooth out the eddy currents created by the mainmast on the back of the mainsail. When the foresail or jib is

sheeted too flat, the mainsail will be back sailed by this spill. It will show by a fluttering or dishing in of the mainsail luff. When this occurs, the jib or foresail must be eased at once by slacking off the sheets. As a general rule, because of the curve of the jib or foresail, the foot of these sails should make an angle of about 15 degrees more with the keel line of the boat than the angle of the foot of the mainsail (Fig. 33-13).

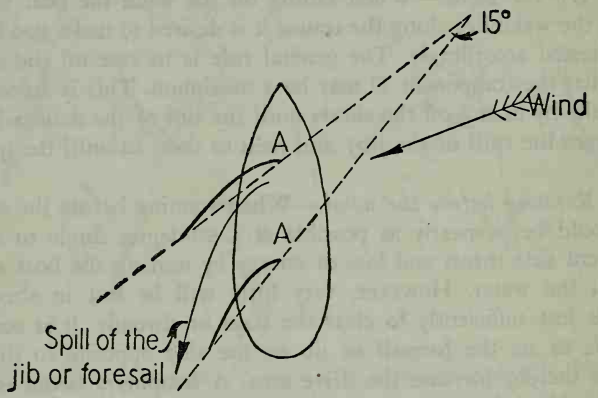


FIG. 33-13.

(3) Members of the crew must never be allowed to get above the gunwale at the points marked *A* in Fig. 33-13 (directly to windward of the area of greatest drive), for by doing so they create eddy currents which reduce the drive of the sails.

(4) In order to obtain a maximum drive from the foot of the sails, they should be raised as high as is practical above the gunwale and as the force of the wind will allow with the ballast available. They will then tend to be clear of the eddy currents created by the hull of the boat. The ballast available (men) should be used in an effort to keep the boat on as near even keel as practicable. This will present a better angle of attack of the wind on the sail and reduce the blanketing effect of the hull on the foot of the sail. Also, the boat will offer less resistance to headway on her designed lines and give maximum resistance with the keel against the leeward component, *L*. The exception is when in light airs a slight list to leeward is required to make the sails *sleep*.

(5) Members of the crew must, so long as the boat is kept on an

even keel, keep below the gunwale so as not to create eddy currents which will cut down the drive from the foot of the sails.

TRIM

By trim of the boat is meant the distribution of ballast, live or otherwise, after sails are set to best advantage. The boat should be trimmed athwartship so as to be kept as near on an even keel as is practicable. The desired fore-and-aft trim in a light or moderate breeze is obtained when the boat holds its course without the use of rudder. In a stiff breeze it is preferable, as a safety precaution, that the boat be trimmed fore and aft so that a slight amount of weather tiller is necessary to hold it on the course (the boat has a tendency to head up into the wind when the tiller is released).

Shifting ballast forward will give the boat a tendency to head up into the wind and will relieve a lee tiller. Shifting ballast aft will give the bow a tendency to drop off and will relieve a weather tiller. This is illustrated in Fig. 33-14.

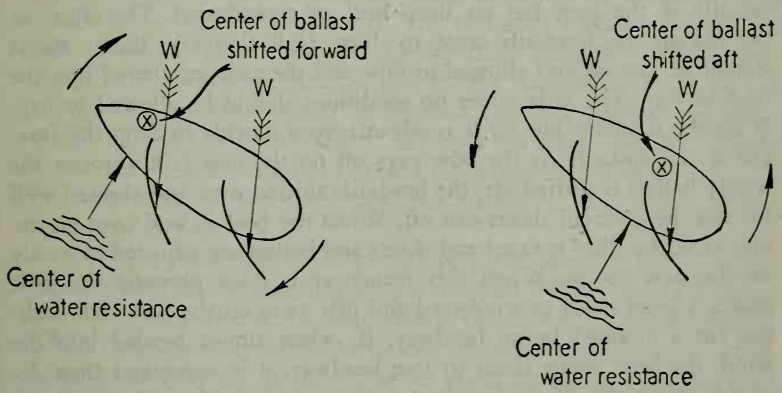


FIG. 33-14.

When running free keep the ballast fairly well aft to hold the rudder deeper in the water and to give the boat a slight drag by the stern.

The ballast should be kept out of the ends of the boat, without being unduly crowded amidships. It is especially important to keep heavy weights out of the bow. As far as is practicable, *sinking ballast,* ballast heavier than water, should not be carried. When it is essential to carry *sinking ballast,* the weight of such ballast shall not exceed the buoyancy

of the boat when filled with water. The lower ballast can be stowed the better, having due consideration for bailing out the boat.

TACKING

In tacking, the following principles apply to any boat: After sails and center of ballast shifted forward tend to bring her head into the wind. Head sails and center of ballast shifted aft tend to keep her off. All sails, so long as they draw, give her headway and so add to the steering power of the rudder.

The above principles are used in the following sequence when it is desired to tack the boat. The sails are sheeted in to bring the boat fairly close-hauled on the wind if not already so. At the moment when less head sea is encountered and the boat has good way on, the tiller is eased down, ballast eased forward, and the mainsail sheeted in amidships gradually as the boat heads into the wind. The foresails are sheeted in, so as to be kept full, as long as they will draw. As the boat approaches heading directly into the wind, the critical moment of the maneuver occurs. Eddy currents must be kept off the mainsail, especially if the boat has no deep keel or centerboard. Therefore, at the instant the headsails cease to draw (luff flutters), their sheets should be cast off and allowed to flow and the sails smothered into the mast or stay. The sails under no conditions should be allowed to flap. With the standing lug rig it is advantageous quickly to drop the foresail at this instant. As the bow pays off on the new tack (crosses the wind) ballast is shifted aft, the headsails shifted over and sheeted well in, and the mainsail sheets cast off. When the boat is well over on the new tack, the tiller is eased and sheets and ballast are adjusted to steady on the new course. When this maneuver is done properly the boat makes a good reach to windward and fills away on the new tack without for a moment losing headway. If, when almost headed into the wind, the boat seems about to lose headway, it is sometimes then desirable to set the jib or foresheet out on old lee side with the sheets just cast off. The sail will act as a back sail to pay her head around. When this is done the main sheets must be cast off as soon as it ceases to draw. To hold the main sheets is liable to make a *back sail* of the mainsail, thereby putting the boat *in irons* or giving her sternboard. Weight should be shifted aft. If the boat gathers sternboard, shift over the rudder and do not sheet in the mainsail until the new tack has been made by backing around. The head sails should be eased over as the boat's stern backs up into the wind. When filling away on

a new tack, it is advisable to run for a short time with slightly eased sheets to regain full headway quickly.

The use of an oar at any time with a boat under sail is lubberly and should only be resorted to in an emergency.

WEARING

Three methods may be used to wear a boat, depending upon the force of the wind.

(1) *In a very light breeze* and when it is desired to come to the other tack by wearing, the tiller is put up slowly, ballast eased aft, and the mainsail sheets eased full off, roundly. As the bow pays off, the headsails are kept filled by gradually easing off the sheets. The boat goes off before the wind. Then as the boat comes to the other tack, the mainsail is sheeted in smartly, shifted over, and eased away steadily on the new lee quarter, the ballast shifted forward, and the headsail sheets cast off and allowed to flow. When well about, all sails and the ballast are trimmed to steady on the new course.

(2) *In a moderate breeze* the same procedure is followed except in the handling of the mainsail. The increased way on the boat will permit relying more upon the rudder than upon the sails to wear. Accordingly, when the tiller is put up, the mainsail is eased off only enough (about 60 degrees) to prevent the boat heeling too deeply when well off the wind. Then, as the wind hauls aft, the mainsail is sheeted in gradually until amidships when the wind is astern. As the boat comes to the other tack, the mainsail is eased away steadily on the new lee quarter.

(3) *In a fresh breeze* the procedure is the same as that in a light breeze except in the handling of the mainsail. When it is necessary to wear in a fresh breeze (tacking should be resorted to whenever practicable) the mainsail should be clewed up or lowered a moment before putting the tiller up. It should be set again on the new quarter when the use of the headsails and the rudder have brought the boat to the new tack.

GENERAL PRECAUTIONARY NOTES

Reefing.—When a boat begins to take water, it is time to reef; she should never, even in smooth water, be allowed to heel too much. A boat that is decked over may run her lee rail awash; but when an open boat is approaching this point it must be remembered that a fresher puff may bear the gunwale lower without warning, and that the moment

it dips the boat will almost certainly fill and capsize. The details of reefing will depend upon the rig, but a few general rules may be laid down. The men should be stationed before beginning, and should all be required to remain seated. One man lowers the halyards, as much as may be necessary, another hauls down on the leech and shifts the tack. The sheet is hauled in a little to let the men detailed for the reef points get hold of and gather in the foot. The sheet is then slacked and shifted, the reef points passed, the halyards manned, the sail hoisted, and the sheet trimmed. It is important to keep the boat under command while reefing, and for this she must have way enough to obey her rudder. If she can be luffed a little and still be kept going through the water sufficiently to obey the rudder, then it is unquestionably wise to luff, but not sufficiently to risk losing control.

If the boat has more than one sail, it is a safe plan to reef them one at a time when the sea is dangerously heavy.

Gybing.—A boom sail is *gybed* when it swings from one side to the other, the wind being aft or nearly so, and the sail full, first on one side and then on the other. The gybe becomes dangerous when the sail is not kept under the control of a taut sheet or when the wind is of sufficient strength to list the boat and swing the stern violently when its force is shifted to the opposite side of the sail. Moreover, the violent sweep of the boom across the stern endangers everybody in its path. To avoid gybing because of an unexpected shift of wind or a deep yaw when running off the wind or running free, the sheets must be tended smartly and the tiller put hard down. By doing so, the swing of the boom may be controlled and checked.

If sitting to windward in a fresh breeze, the crew should move amidships when passing under the lee of a vessel or other object, where the wind may fail or even shift in an eddy.

It is a universal rule in boat sailing *that the sheets should never be belayed in any weather.*

The sails being properly sheeted and drawing full, a careful watch must be kept for squalls when sailing on the wind.

As the wind will vary more or less (in apparent if not real direction), it is necessary to be watchful and to bring the boat up or keep her away, from time to time, in order that she may be always at her best.

Advantage should be taken of the increased wind velocity of a squall in a light breeze. The boat should first be eased off slightly and the sheets eased under the first impulse of the squall and when good headway is obtained, sheeted in and luffed up fully to gain way to windward.

In a stiff breeze the boat should be luffed for a moderate squall to prevent taking water. The luff should be only sufficient to shake, without spilling the sails, thus keeping headway enough to retain control, but with the sheets (as always) in hand. If the squall is a strong one, not only should the boat be luffed promptly but the sheets should be eased off at once. In a sudden emergency the sheets may be let go and control lost, but the longer the boat can be kept under control the better.

When running well off the wind or running free, squalls cannot be met by spilling the sails. More than a touch of the tiller would be required to do so. Accordingly, the only prudent thing is to slack the sheet while luffing.

The tendency of the wind to capsize the boat would be much reduced by running off. Ordinarily this is not a safe maneuver for if the squall becomes too strong there is no recourse but to lower the sails, and the chances are they will bind against the shrouds. Moreover, there is always the danger of the wind shifting in the squall to such an extent as to gybe the mainsail with force.

When the sea is rough, the sails should be kept fuller than in smooth water. It is more important that the boat be kept going so as to be always under command of the rudder than it is to try to point high to windward. Also, more distance will be gained to windward.

If a heavy breaking sea is seen bearing down on a boat, she should be luffed up to meet it. The boat should be kept away again as soon as the sea has passed. The boat should not be luffed too high for if she loses way she becomes helpless at once.

It is dangerous to be caught by a heavy sea on the beam. Therefore, if the course to be made in rough water would bring the boat into the trough of the sea, the best plan is to run off for a time with the sea on the quarter, then bring her up with it on the bow, and so make good the course desired without actually steering it at any time.

Running before the wind in a fresh breeze in a rough sea is the most dangerous point of sailing. The danger of gybing is increased because the boat will certainly yaw considerably despite the very careful steering that will be demanded. As a precaution against gybing, the boom should be lashed to the rail or to a shroud by a *lazy guy,* which can be loosed quickly in an emergency.

A serious danger in running before a heavy sea is that of *broaching to*. The boat will yaw considerably, the rudder will be often out of water when it is most needed to meet her, and the sails will be be-

calmed in the trough of the sea. The situation here is much like that of a boat running in a surf. The yawing will be reduced by keeping the ballast aft and by steering with an oar. The jib should always be set, with the sheet hauled aft. It helps to meet and pay her off if she *flies to* against the rudder. A drag towed over the stern of the boat is also helpful. A long bight of heavy line used in this manner makes a rather effective drag.

A further danger is that the boom may dip in the water as the boat rolls and thus capsize the boat. The boom should be brailed up as necessary to prevent this.

The masts should be properly stayed vertical (in the athwartship direction) to the heel. If this is not done, the sails will not give the maximum drive on both tacks. Furthermore, dampening eddy currents will be set up about the mainsail. The masts should be stayed vertical to the keel (in the fore-and-aft direction) or preferably with a slight rake *forward* (not more than 4 degrees). A mast raked aft reduces the drive of the sail as the luff then does not enter the wind stream normally.

No one shall climb the mast of a very small boat. If halyards or brails, etc., are unrove, unstep the mast, repair the damage, and step the mast again.

In a light breeze, the sails should be lofted as high as is practicable on the masts as the force of the breeze increases with altitude. As the breeze stiffens, the sails should be spread lower on the mast, in order to reduce the heel of the boat and the leeway.

Coming alongside under sail requires care, judgment, and experience. In the first place, it should not be attempted if a boat or other obstruction which the mast could touch overhangs the gangway, nor in rough weather when the rolling motion of the boat would cause the mast to strike the gangway platform. In such cases, the mast should be unstepped and the boat brought alongside the gangway under oars.

If the ship is riding to a windward tide, approach the gangway from abaft the beam, tend all gear, and shorten sail when boat has sufficient way to reach the gangway. The bow and stroke oarsmen tend boat hooks, the other men performing their duties in shortening sail.

If the ship is riding to the wind, approach the gangway from abeam, tend all gear, bow and stroke oarsmen stand by with boat hooks; when there is sufficient way to make the gangway, command:

In jib and foresail. The jib tack and sheet are let go, jib lowered; lower the foresail or brail it up, at the same time put the tiller hard down; haul main boom amidships or a bit on the weather quarter. This throws the boat's head into the wind, and hauling main boom to windward deadens her headway, when desirable. When alongside command: *In mainsail;* furl sails, and unstep, if desirable.

The above is the surest and safest method, but with skillful handling all sails may be taken in together, the tiller put hard down, and boat rounded up to the gangway. This requires more skill and judgment and should not ordinarily be attempted.

If there is any current, make allowance for it by heading for a point farther forward or aft, as the case may be.

RULES OF THE ROAD

(1) When two boats under sail are approaching one another so as to involve risk of collision, one of them shall keep out of the way of the other as follows:

(*a*) A boat which is running free shall keep out of the way of a boat which is close-hauled.

(*b*) A boat which is close-hauled on the port tack shall keep out of the way of a boat which is close-hauled on the starboard tack.

(*c*) When both are running free, with the wind on different sides, the boat which has the wind on the port side shall keep out of the way of the other.

(*d*) When both are running free, with the wind on the same side, the boat which is to windward shall keep out of the way of the boat which is to leeward.

(*e*) A boat which has the wind aft shall keep out of the way of other boats.

(2) When a boat under power or oars and a boat under sail are proceeding in such directions as to involve risk of collision, the boat under power or oars shall keep out of the way of the boat under sail.

(3) Where, by any of these rules, one of the two boats is to keep out of the way, the other shall keep her course and speed.

(4) Every boat which is directed by these rules to keep out of the way of another boat shall, if the circumstances of the case permit, avoid passing ahead of the other.

(5) Every boat, whether under power, oars, or sail, when overtaking any other shall keep out of the way of the overtaken boat.

PREPARATIONS PRIOR TO SAILING

In preparing for sailing the following should be done:

(1) Check up and overhaul all sails, spars, and rigging.
(2) Remove dead ballast, except water breakers, if any is in boat.
(3) Rig bowsprit if one is to be used.
(4) Remove unnecessary thwarts.
(5) See that required boat gear is in the boat.
(6) See that step is clear and that king-pin and gate are present.
(7) Lash sails to booms and secure to mast or stay as necessary.
(8) Attach all rigging as necessary.
(9) Step masts and secure shrouds and backstays.
(10) Check to see that all is in readiness and stand by stations.

BOATS UNDER SAIL (DRILLS)

Commands, stations, and duties for Navy standing lug rig.—A boat rigged with the Navy standing lug rig can be smartly handled with a crew of 6 men. Additional crew should be used to trim the boat by the proper distribution of weight.

(1) The coxswain is at tiller, in charge of boat, and gives commands.

(2) No. 1 is in charge of the foresail, tends the foresheets, reports when the foresail is ready.

(3) No. 2 tends and mans the fore halyards, dips the lug (fore), lookout forward.

(4) No. 3 tends foot of foresail.

(5) No. 4 tends and mans the main halyards, dips the lug (main).

(6) No. 5 is in charge of the mainsail and tends the main sheets; reports when the mainsail is ready.

Note.—No. 3 is not required to sail the boat. He is valuable in getting the trim of the boat through distribution of weight. By tending the foot of the foresail, he improves the smartness of the handling of the boat.

Being Under Oars, To Make Sail

Command	Duties
Way enough. Stand by to step masts.	Oars are boated same as under "Pulling boats." All hands cast off spar covers and unlash sails from masts. Starboard thwartmen launch mainmast forward until heel of mast is even with step, halyard sheaves fore and aft, standing part of the halyards abaft the mast, and the masthead slightly raised.

Command	Duties
	Similarly, port thwartmen launch foremost to position and raise the masthead slightly.
	The crew remains seated whenever their duties will permit, always *keeping down in the boat.*
Step the masts.	Starboard thwartmen stand on bottom boards and raise mainmast.

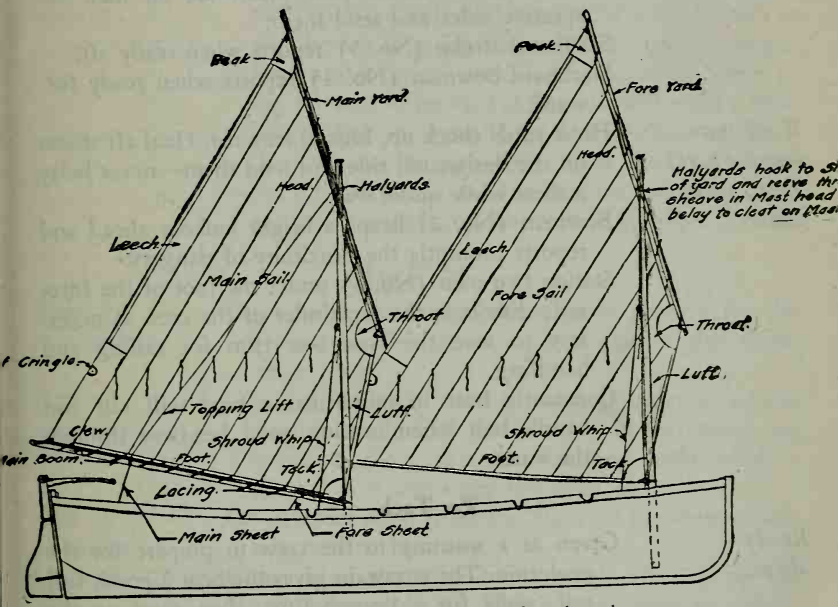


FIG. 33-15—30-foot cutter, standing lug rig.

	Port thwartmen stand on bottom boards and raise foremast.
	Bow (No. 1) and stroke oarsmen (No. 5) get masts on proper slew and, when nearly vertical, guide them into the steps.
	Bow and stroke oarsmen and second bow and second stroke set up shrouds.
Stand by to make sail.	Starboard thwartmen light the mainsail aft and hook on the yard; second starboard stroke (No. 3) secures the jaws of the main boom in place.

Command	Duties
	Second port stroke (No. 4) stands by to hoist away on the halyards.
	Port thwartmen clear away the foresail and hook on the yard; starboard bowman (No. 1) lashes tack of foresail to eyebolt in foremast; port bowman (No. 2) stands by to hoist away on halyards.
	Men most convenient pass sheets aft on their respective sides and tend them.
	Starboard stroke (No. 5) reports when ready aft.
	Starboard bowman (No. 1) reports when ready forward.
With starboard (port) sheet, make sail.	Hoist yards chock up, lugs to leeward. Haul aft sheets on the designated side and tend them—never belay a sheet while under way.
	Bowman (No. 2) keeps a bright lookout ahead and reports promptly the proximity of dangers.
	Station two men (No. 3) under the foot of the foresail; distribute the remainder of the crew as necessary to give the boat best trim for sailing and handling.
	Constantly bear in mind that a boat will sail and handle best when making good headway through the water.

To Tack

Ready about.	Given as a warning to the crew to prepare for the evolution. The coxswain gives the boat a good, full sail, waits for a smooth time, then *eases* up the rudder. At the same time the man tending the mainsheet (No. 5) hauls the main boom amidships slowly. (Care must be taken not to haul it across the midship line, for it will then act as a back sail.) Keep sails drawing and boat going ahead as long as possible. As the boat's head comes to the wind, the man tending the foresheet (No. 1) takes in the slack as it comes to him.
Shift over foresheet.	As the boat's head passes the wind and the foresail fills from the new side, the men (No. 3) under the foresail grasp the foot of it and carry it bodily

Command	Duties
	across *with the wind;* not forcing it over, but carrying it with the wind, keeping it from flapping and shifting the sheet smartly as the foot of the sail goes across.
	If the boat gathers sternboard, shift the tiller.
Haul aft sheets.	When the boat has passed the wind and is on the new tack, trim the sails as desired. It is not necessary to dip the lug in going about. However, in making a long board on one tack, it may be worth while to dip the lugs to leeward as the sails will stand a little better. This can usually be done without touching the halyards, the men (No. 2 and No. 4) grasping the luff of the sail and the forward end of the yard and bearing down on them while the sheet is slack.

To Wear

Stand by to wear.	Given as a warning to the crew to prepare for the evolution. The coxswain puts the rudder down when ready.
Ease off mainsheet.	Given as the boat's head pays off, in order to get the maximum effect of the mainsail in increasing her headway. Keep fast the foresheet until wind is abeam, as it helps pay her head off.
Ease off foresheet.	Given when wind is abeam. Slack off the sheet gradually to give headway.
Up mainsail.	Given when the wind comes nearly aft. Top up the main boom (No. 4). This is unnecessary in a light breeze, but in a moderate breeze or anything stronger it should be done on account of the danger of gybing. In a strong breeze give the order *Down mainsail* and lower the mainsail.
Shift over the sheets.	Given when wind is aft. Stand by to haul sheets aft on new side.
Down mainsail.	Given when wind is a little on the new weather quarter. Set mainsail and haul aft mainsheet, leave foresheet flying or smother sail into the mast, so boat's head will come up rapidly.
Haul aft foresheet.	Given as boat comes by the wind on the new tack. Haul aft foresheet and trim both sails.

To "Heave-To"

It is not practicable to heave-to with the Navy standing lug rig as the rig does not include a jib. When it is desired to heave-to, the same result can be accomplished, without undue loss of time in later picking up way, by shortening sail. The simplicity of the lug rig makes this a practical evolution. For the orders and execution of shortening sail, see following sections.

Command	Duties
	To Reef Sail
Stand by to reef.	Given as a warning to prepare for the evolution. Tend halyards. Prepare earings and reef points. Coxswain brings boat by the wind in order to retain headway and keep her under control while reefing.
Reef sail.	The coxswain luffs slightly. Halyards are slacked down just enough to pass reef earings and reef points. Secure reef earings and pass reef points around *foot* of sail, *not* around boom.
Make sail.	Given when ready. Men at halyards hoist sails and coxswain lays the boat on the desired course. When a boat begins to take water, it is time to reef. She should never, even in smooth water, be allowed to heel too much.
	To Shake Out Reefs
Stand by to shake out reefs.	Given as a warning to prepare for the evolution. Tend all halyards. Coxswain brings boat by the wind.
Shake out reefs.	Coxswain luffs slightly. Halyards are slacked down just enough to cast off earings and reef points.
Make sail.	Men at halyards hoist sails and coxswain lays the boat on the desired course. Keep boat under control at all times.
	To Shorten Sail (As for a heavy squall)
Stand by to shorten sail.	Given as a warning to prepare for the evolution. Tend halyards. The coxswain lays boat by the wind.
Shorten sail.	The coxswain luffs. The yards are lowered. Crew awaits next command, which may be either to make sail or to furl sail.

Command	Duties
	To Take in Sail
Stand by to shorten sail.	Proceed as described above for this evolution.
Shorten sail. *Furl sail.*	Cast off foretack and jaws of main boom. Starboard thwartmen unhook and furl mainsail, using the sheets as gaskets; similarly, the port thwartmen unhook and furl foresail.
Stand by to unstep.	Cast off shrouds. Starboard thwartmen prepare to receive the mainmast; port thwartmen prepare to receive foremast.
Unstep.	The bowman (No. 1) and stroke oarsman (No. 5) seize their respective masts and lift them vertically until they are clear of the thwarts, at the same time inclining them in the proper directions. They are then lowered, foremost on port side, mainmast on starboard side. Men amidships stand on bottom boards to receive and stow them. The crew then places the foresail and mainsail along their respective masts, lashes them with the shrouds, and quickly takes seats on the thwarts.

Commands, stations, and duties for Navy sloop rig.—A boat rigged with Navy sloop rig can be smartly handled with a crew of 10 men. Additional crew should be used to trim the boat by the proper distribution of weight.

(1) The coxswain is at tiller, in charge of boat, and gives commands.

(2) No. 1 is in charge of the jib, tends the jib sheets, reports when the jib is ready.

(3) No. 2 mans and tends the jib halyard; acts as lookout.

(4) No. 3 mans and tends the jib downhaul.

(5) No. 4 clears the mainmast rings in making sail; hauls down on rings in shortening sail; acts as bowman alongside dock or vessel.

(6) No. 5 mans and tends throat halyards.

(7) No. 6 mans and tends peak halyards.

(8) No. 7 mans and tends main boom topping lift and assists Nos. 5 and 6.

(9) No. 8 assists Nos. 5 and 6 when making sail; acts as sternman when alongside dock or vessel; assists No. 9 on mainsheet.

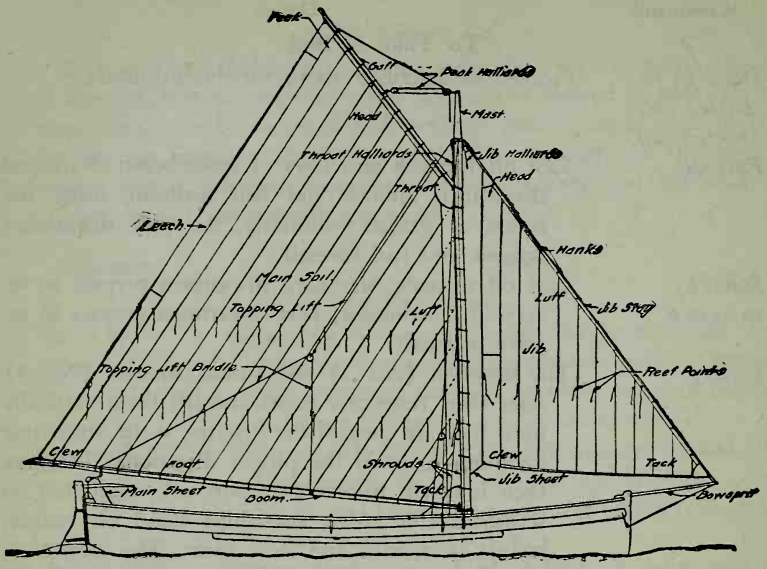


FIG. 33-16—Motor launch, sloop rig.

Command	Duties

(10) No. 9 is in charge of mainsail and tends mainsheet; reports when main is ready.

Being Under Power to Make Sail

Stop engine. Clutch is thrown out and ignition cut.

Stand by to step mast; rig bowsprit.

All hands place mast on fore-and-aft line with step forward and cast off spar covers. Unlash sails from mast. Nos. 1 and 2 ship bowsprit. Nos. 3 and 4 reeve and man the jib halyards which are used in raising the mast.

The standing part of the jib halyard is hooked into the ring bolt in the bow and the hauling part is led through this ring bolt.

Nos. 5 and 6 reeve and tend shrouds. See all gear clear.

Nos. 7, 8, and 9 place heel of mast in step. Put in king-pin.

Command	Duties
	No. 9 reports when all is ready to step.
Step mast.	Nos. 1, 2, 7, 8, and 9 raise mast. At the same time Nos. 3 and 4 hoist away on jib halyards, and Nos. 5 and 6 tend shrouds to steady mast.
	Close main gate.
Rig boat.	Nos. 1 and 2 secure jib and tack and attach jib halyard and downhaul.
	Nos. 3 and 4 set up shrouds.
	Nos. 5 and 9 bend main luff to rings.
	Nos. 5 and 6 secure throat and peak halyards.
	No. 7 secures topping lift and bridle.
	No. 8 ships gooseneck and passes the panel lashing.
	No. 9 clears mainsheet and hooks lower block to traveler.
Stand by to make sail.	Crew takes assigned stations. Man halyards, jib downhaul, main-boom topping lift and sheets; stand by to clear rings.
With starboard (port) sheet, make sail.	Coxswain lays boat on desired course.
	Men stationed on halyards hoist away smartly, hand over hand, keeping gaff horizontal until mainsail is all the way up. Clear mast rings. No. 8 must see that peak of mainsail does not foul bridle of topping lift, especially when making sail on port tack.

To Tack

Ready about.	Given as a warning for the crew to prepare for the evolution. Coxswain gives boat a good, full sail, waits for a smooth time, then eases up the rudder.
	At the same time the man tending the mainsheet hauls the main boom amidships slowly.
Ease off jib sheet.	Given when jib begins to shiver, never before.
Shift over mainsheet.	When wind is ahead, shift over the mainsheet.
Haul aft jib sheet.	As soon as the bow of the boat has passed the wind, haul aft jib sheet, leaving the mainsheet slack until the boat is well around, then trim by the wind.

Note on tacking.—The boat should be *sailed* around and not jammed into the wind and backed around. To do this the tiller must be eased

Command	Duties

down slowly and the main boom hauled amidships very slowly, but not across the midship line, for it will then act as a back sail.

In a light breeze, the boat will appear inclined to stop head to wind, due to the drag of the propeller. If this occurs, haul aft the new weather jib sheet. This will be taken aback and will pay her head around. If the boat gathers sternboard, shift the tiller.

In a gentle to moderate breeze, the boat will tack without backing the jib. If, after having come about, the boat falls off too far from the wind, flow the jib sheet and sail her up to the wind, hauling sheets aft slowly. If sheets are hauled flat immediately, the boat will lose ground to leeward. When nearly high enough, haul aft the jib sheet and trim by the wind.

To Wear

Stand by to wear.	Given as a warning to prepare for the evolution. The coxswain puts the rudder down when ready.
Ease off mainsheet.	Given as her head pays off in order to get the maximum effect of the mainsail in keeping headway. The jib sheet is kept fast to help pay off her head.
Ease off jib sheet.	Given when wind is a little abaft the beam. The sheet is slacked slowly in order to give headway.
Down main peak.	Given when wind is nearly aft. Slack peak halyards, until gaff is perpendicular to mainmast. *Mainsheet must be rounded in rapidly.*
Shift over sheets.	Given when wind is aft. Stand by to haul all sheets aft on the other side.
Up main peak.	Given when main boom has been gybed and wind is on new weather quarter. Set mainsail and haul sheet aft; leave other sheets flying so she will come up rapidly.
Haul aft jib sheet.	Given as she comes by the wind on new tack. Trim both sheets aft, but not too flat.

To Reef Sail

Stand by to reef.	Given as a warning to prepare for evolution. Tend all halyards. Coxswain brings boat by the wind.
Slack down halyards.	Coxswain luffs slightly, but not enough to cause boat to lose headway. Throat, peak, and jib halyards are slacked sufficiently to bring the single reef points down to the boom.

Command	Duties
Reef sail.	Secure tack lashing and then reef earing. In passing earing, first take a *hauling-out turn* to stretch the sail along the boom, then take a *holding-down turn* around boom and through cringle. Pass reef points around *foot* of sail, *never* around boom. Men in charge of parts of boat report when ready.
Hoist away.	Men at halyards hoist sails, and coxswain lays the boat on desired course; always keep boat under control while reefing. Reef when boat begins to take in water over lee rail or sooner if considered necessary. Never be afraid of reefing too soon.

To Shake Out Reefs

Stand by to shake out reefs.	Given as a warning to prepare for the evolution. Tend all halyards. Coxswain brings boat by the wind.
Slack down halyards.	Coxswain luffs slightly, but not enough to cause boat to lose headway. Jib, peak, and throat halyards are slacked handsomely.
Shake out reefs.	Come up reef points first, then ease away earings and tack lashings together. Men in charge of parts of boat report when ready.
Hoist away.	Men at halyards hoist sails. Coxswain lays boat on desired course.

To "Heave-To"

Stand by to heave-to.	Given as warning to prepare for the evolution. Coxswain brings boat by the wind and keeps rudder up.
Haul main boom amidships; haul aft weather jib sheet.	These commands are given simultaneously and are obeyed by the men at their stations. If bow falls off, slack away jib sheet. If bow comes into the wind, ease rudder and slack away mainsheet. In this condition, the boat should lie dead in the water, wind abeam.

To Get Under Way from "Heave-To"

Make sail.	Haul taut jib sheet, ease rudder, and ease off main boom.

Command	Duties
	Dousing and Furling Sail
Stand by to shorten sail.	Given as a warning for crew to stand by their stations. Man jib downhaul; tend all halyards; take in slack of main-boom topping lift; stand by to haul down on mast rings and on leech of mainsail.
Shorten sail.	Slack away halyards roundly, keeping gaff in horizontal position; haul down jib; haul down on mast rings and leech of mainsail; trim sheets in. No. 3 gathers in jib to keep it from going overboard; sails must be kept in the boat.
Furl sail.	Belay main sheet; haul aft and belay port jib sheet. Haul taut and belay jib downhaul. In furling, haul all sail and dog's ears over to port side of booms (opposite to that on which main-boom topping lift is secured). Furl jib and main sail in same direction. Pass in leech of sail taut along boom; begin at lowest part and roll sail up neatly, stowing all earings, etc., inside, and make a taut skin. Pass gaskets so that they will tend to haul sail *on top* of boom.
	Unhook sister hooks of jib halyards from head of sail; hook one in clew and other over jib stay; haul taut halyards and belay, tricing sail up along jib stay. Haul taut and belay both jib sheets.
	See all gear hauled taut and neatly laid up or Flemished down.
	To Unstep Masts
Prepare to unstep.	Remove thwarts and place fore and aft, outboard; remove bottom boards in wake of heels of masts and provide marlinespike and hammer. Unhook jib halyards from clew of jib and hook in ring bolt in eyes of boat, reeve hauling part of jib halyards through ring bolt and belay to Samson post. Come up jib stay; come up main shrouds, keeping one turn with them only. Unship main-boom gooseneck, and swing to starboard side of mast; come up main gaff parrel lashing. Cast off main-boom topping lift, putting figure-of-8 knot in end so it will not unreeve; unhook lower block of mainsheet from traveler.

Command	Duties
Stand by.	Tend main throat halyards and main shrouds; prepare to open main gate. Nos. 5, 6, 7, 8, and 9 stand by to receive mainmast as it is lowered.
Unstep mainmast, ease away, haul down.	Open main gate; ease away on main throat halyards; haul down on mainstay; steady mast by tending main shrouds, and lower it. Launch main boom forward as mast is lowered, sliding hoops toward masthead. Lower mast until details can support it with their shoulders and then remove king-pin. Place mast outboard on starboard side.

Commands, stations, and duties for Navy ketch rigs.—A boat rigged with the Navy ketch rig can be smartly handled with a crew of 6 men. Additional crew should be used to trim the boat by a proper distribution of weight.

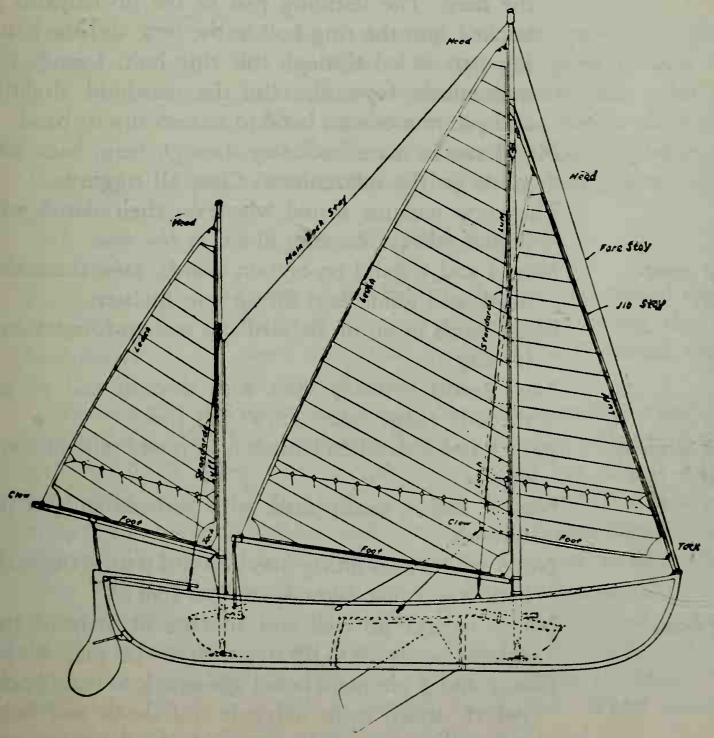


FIG. 33-17—Ketch rig.

Command	Duties

(1) Coxswain is at tiller, in charge of boat, and gives commands.

(2) No. 1 is in charge of the jib, tends the jib sheets, reports when the jib is ready.

(3) No. 2 mans and tends jib and main halyards, lookout forward.

(4) No. 3 mans main and mizzen halyards and tends mizzen sheets.

(5) No. 4 tends main sheets and, when making sail, mizzen sheets.

Being Under Oars, to Make Sail

Way enough. Oars are boated as before described.

Stand by to step masts. The masts are stepped separately. Launch mainmast aft, raise the masthead slightly, and pin the mainmast band to the main thwart band. No. 1 reeves and mans the jib halyards which are used in raising the mast. The standing part of the jib halyards is hooked into the ring bolt in the bow and the hauling part is led through this ring bolt. Launch the mizzenmast forward, raise the masthead slightly, and pin mizzenmast band to mizzen thwart band.

No. 5 reeves main back stay through main back stay guide on the mizzenmast. Clear all rigging.

The crew remains seated whenever their duties will permit, always *keeping down in the boat.*

Step mainmast. Nos. 4 and 5 stand on bottom boards, raise the mainmast, and guide heel fitting into the step.

No. 1 hauls in on jib halyard and sets up forestay and jib stay.

Nos. 2 and 3 steady mast with shrouds and set up shrouds (mast rakes 3/16″ per foot).

Step mizzenmast. Nos. 1 and 2 stand on bottom boards and raise mizzenmast.

Nos. 3 and 4 steady mast with shrouds and set up shrouds.

No. 5 guides heel fitting into step and sets up the main back stay (mast rakes 3/16″ per foot).

Rig boat. No. 1 secures jib tack and attaches jib halyard and sheets; bends jib to jib stay with the jib snap hooks.

Nos. 2 and 3 pin main-boom gooseneck to main-boom swivel, attach main halyards and sheets and bend mainsail to mast and boom with the slides and sail

Command	Duties
	tracks. The clew lashing is passed so that the foot of the sail has the desired tautness for the existing breeze. The swivel lashing is passed to set the swivel as high as is desired for the existing breeze. Nos. 4 and 5 bend the mizzensail in the same manner as the mainsail is bent and lower the centerboard.
Stand by to make sail.	Crew takes assigned stations; mans halyards and sheets.
With starbord (port) sheet make sail.	Coxswain lays boat on desired course. Men stationed on halyards hoist away smartly, hand over hand. Sheet in sails as necessary and distribute live ballast.

To Tack

Ready about.	Given as a warning for the crew to prepare for the evolution. The coxswain gives the boat a good, full sail, waits for a smooth time, eases up the rudder. At the same time the man tending the mizzen sheet hauls the mizzen boom amidships slowly.
Ease off jib sheet.	Given when the jib begins to shiver, never before.
Shift over mainsheet.	Given when the wind is ahead.
Haul aft the jib and mainsheets.	As soon as the bow of the boat has passed the wind, haul aft jib and mainsheets, leaving the mizzen sheet slack until the boat is well around, then trim all sheets by the wind.

Note on tacking.—The boat should be *sailed* around and not jammed into the wind and her way killed. Despite the ease with which the boat will handle if fitted with a centerboard, once her way is killed the boat will back around and lose ground to windward. The boat is sailed around by applying rudder and hauling the mizzen boom amidships slowly. If the boat loses headway, haul aft the new weather jib sheet. This will be taken aback and will pay her head around. If the boat gathers sternboard, shift the rudder. If, after having got around, the boat falls off too far from the wind, flow the jib sheet, and sail her up to the wind, hauling sheets aft slowly. If sheets are hauled flat immediately, the boat will lose ground to leeward. When nearly high enough, haul aft the jib sheet and trim by the wind.

Command	Duties
	To Wear
Stand by to wear.	Given as a warning to prepare for the evolution. The coxswain puts rudder down when ready.
Ease off main and mizzen sheets.	Given as her head pays off in order to get the maximum effect of these sails in keeping headway. The jib sheet is kept fast as it helps to pay off her head. Do not let booms get out more than about 60 degrees from the keel line.
Ease off jib sheet.	Given when wind is a little abaft the beam. The sheet is slacked slowly in order to give headway.
Sheet in main and mizzen.	Given when wind is on the quarter. The sheets are taken in roundly so that both booms are amidships as the wind passes astern. (Do not let booms gybe violently.)
Shift over sheets.	Given when wind is aft. Stand by to haul all sheets aft on the other side.
Haul aft jib sheet.	Given as boat comes by the wind on the new tack.
	To Reef Sail
Stand by to reef.	Given as a warning to prepare for the evolution. Tend all halyards. Coxswain brings boat by the wind.
Slack down the halyards.	Coxswain luffs slightly but not enough to cause the boat to lose headway. Peak and jib halyards are slacked sufficiently to bring the reef points down to the foot of the sails.
Reef sail.	Secure tack lashing and then reef earing. In passing earing first take a *hauling-out turn* to stretch the sail along the boom, then take a *holding-down turn* around the boom and through the cringle. Pass reef points around the *foot* of the sail, *never* around the boom. Secure the main-boom gooseneck at the lowest point of a swivel. Men in charge of sails report when ready.
Hoist away.	Men at halyards hoist sails. Coxswain lays the boat on desired course; always keep boat under control while reefing. Reef when boat begins to take water over lee rail or sooner if considered necessary. Never

Command	Duties
	be afraid of reefing too soon. It is sometimes advantageous to reef sails in succession, beginning with the mainsail, in order to keep boat under control while reefing.
	To Shake Out Reefs
Stand by to shake out reefs.	Given as a warning for crew to prepare for the evolution. Tend all halyards. Coxswain brings boat by the wind.
Slack down halyards.	Coxswain luffs slightly, but not enough to cause boat to lose headway. Jib and peak halyards are slacked handsomely.
Shake out reefs.	Come up reef points first, then ease away earings and tack lashings together. Men in charge of parts of boat report when ready.
Hoist away.	Men at halyards hoist sails. Coxswain lays boat on desired course.
	To "Heave-To"
Stand by to heave-to.	Given as a warning to the crew to prepare for the evolution. Coxswain brings boat by the wind and keeps rudder up.
Haul mizzen boom amidships; haul aft weather jib sheet; down mainsail.	These commands are given simultaneously and are obeyed by the men at their stations. If the bow falls off, slack away jib sheet. If bow comes into the wind, ease rudder and slack away mizzen sheet. In this condition boat should lie dead in the water, wind about abeam.
	To Get Under Way from "Heave-To"
Make sail.	Haul aft jib sheet, each rudder and ease off mizzen sheets. Hoist mainsail and set sheets.
	Dousing and Unbending Sail
Stand by to shorten sail.	Given as a warning for crew to stand by their stations. Tend all sheets and halyards and stand by to haul down on main and mizzen slides.
Shorten sail.	Slack away halyards roundly; haul down on jib; haul down on slides; trim sheets in.

Command	Duties
Unbend sails.	Belay main and mizzen sheets. Unbend jib from jib stay. Unbend main and mizzen from mast and boom slides. Secure jib halyards (both ends) to cleat on mainmast. Secure main and mizzen halyards to ends of booms and top up booms clear of boat. Haul taut main and mizzen sheets. See all gear hauled taut and neatly laid up or Flemished down.

To Unstep Masts

Prepare to unstep.	Cast off main and mizzen halyards from ends of booms and secure on cleats at masts. Cast off sheets. Unship main and mizzen booms. Hook standing part of jib halyard in ring bolt in the bow and reeve hauling part through the ring bolt. The jib halyard is used to ease away on mainmast. Come up jib, fore, and main back stays.
Unstep mizzenmast.	Nos. 3 and 4 come up mizzen shrouds, keeping them in hand. No. 5 pulls king-pin in step. Nos. 1 and 2, standing on bottom boards, lower mast forward as Nos. 3 and 4 ease off on shrouds. No. 5 pulls pin in mast band when mast is down.
Unstep mainmast.	Nos. 2 and 3 come up main shrouds, keeping them in hand. No. 1 pulls king-pin in step and slacks off on the jib halyard. Nos. 4 and 5 stand on bottom boards and lower mast. No. 3 pulls pin in mast band.

SAILING RACES; GENERAL RULES

4045. (1) **The standard sailing course** will be a triangular course of three 2-mile legs (total, 6 miles). If conditions make a triangular course undesirable, the total length shall be about 6 miles.

(2) **Time to finish is** marked when the foremast of 2-masted, or the mainmast of single-masted vessels crosses the line. Similarly on the start, the position of the mast in regard to the starting line is to be used in determining whether or not the boat crosses before the gun is fired.

Right of way.—(3) When one boat is approaching another boat, so as to involve risk of fouling, one of them shall keep clear of the other as follows:

(*a*) A boat free shall keep clear of one close-hauled.

When both boats are close-hauled, or both free, or both have the wind aft, and have wind on the opposite sides, the boat with the wind on the port side shall keep clear.

(*b*) When both boats are free, or have the wind aft and have the wind on the same side, the boat to windward shall keep clear.

(*c*) A boat with the wind aft shall keep clear of a boat on any point of sailing.

(*d*) An overtaking boat shall, as long as an overlap exists, keep clear of the boat which is being overtaken.

(*e*) An overlap is established when an overtaking boat has no longer a free choice on which side she will pass, and continues to exist as long as the leeward boat, by luffing, or weather boat, by wearing away, is in danger of fouling.

(*f*) When of two boats, one is obliged to keep clear, the other shall not so alter her course as to involve risk of fouling.

(*g*) A boat may luff as she pleases in order to prevent another from passing her to windward, provided she begins to luff before an overlap is established.

(*h*) A boat shall not bear away out of her course so as to hinder another boat from passing to leeward.

(*i*) A boat shall not become entiled to her rights on a new course until she has filled away.

(*j*) When two boats, both close-hauled on the same tack, are converging by reason of the leeward boat holding a better wind, and neither can claim the rights of a boat being overtaken, then the boat to windward shall keep clear.

(*k*) If an overlap exists between two boats when both of them without tacking are about to pass a mark on a required side, then the outside boat must give the inside boat room to pass clear of the mark. A boat shall not, however, be justified in attempting to establish an overlap and thus force a passage between another boat and mark after the latter has altered her helm for the purpose of rounding.

(*l*) A mark is any vessel, boat, buoy, or other object to indicate the course.

(*m*) When a boat is approaching a shore, shoal, pier, rock, vessel, or other dangerous obstruction, and cannot go clear by altering her course without fouling another boat, then this latter shall, on being hailed by the former, at once give room; and in case one boat is forced to tack or bear away, in order to give room, the other shall also tack, or bear away, as the case may be, at as near the same time as possible without danger of

fouling. But should such obstruction be a designated mark of the course, a boat forcing another to tack under the provisions of this section shall be disqualified.

(*n*) Carrying away mast or gear through defect in the rigging due to the fault or negligence of the boat's crew even though a foul has been committed, will not be considered a disability within the meaning of this rule. Carrying away mast or gear, when not fouled, will never be considered a disability within the meaning of this rule.

(4) If, in consequence of any foul committed any time after the warning gun, the *boat* which has been *fouled or disabled* may demand the right to sail the race again before another race can be sailed, or the original prize or prizes awarded in that race. The word "disabled" shall be understood to mean damage which would, in the opinion of the judges, materially affect the result of the race.

(5) (*a*) **No means of propulsion** other than sails shall be employed either in stays or free route except as follows:

(*b*) **A boat running aground, or fouling a buoy** (not marking the course), pier, vessel (other than another boat entered in the same or another race), or other object, may use her anchors, warps, or boat hooks to get clear or she may, when aground, float herself by pointing her oars, but they shall not be used in any other manner than by pointing and then only to get afloat. In no case is she allowed to receive any assistance except from the crew of the vessel which she fouls. Any anchor, warp, boat hook, or oar so used must be taken on board again before continuing the race.

(*c*) A boat shall not warp, kedge, pole, or make fast to buoy, pier, vessel, or other object.

CHAPTER 34

MARLINESPIKE SEAMANSHIP

General 381
Rope 381
Fiber rope 382
Uncoiling Manila rope 382
Small cordage 383
Size of fiber rope 384
Care of fiber rope 385
Care of fiber rigging 385
Knotting 386
Miscellaneous methods of securing 388
Splicing 391
Seizing 393
Worming, parceling, and serving 393
Palm and needle 394
Sennit 394
Turk's-head 396
Coxcombing 397
Pointing ropes and hawsers 400
Power-boat trimmings 401

GENERAL

MARLINESPIKE seamanship deals with rope and the methods of working it, as knotting, splicing, seizing, etc. Rope includes small cordage, fiber rope, wire rope, in fact, all types and sizes of rope.

Rope, in some of its forms, is constantly used by practically every man on board ship, and every sailor should take great pride in learning how to handle it. The importance of marlinespike seamanship is indicated by the fact that a man is required to take examinations on it for promotion throughout the deck rates, including chief boatswain's mate.

An expert knowledge of this art can be gained only by continued practice, and use should be made of every opportunity to gain this knowledge.

ROPE

Manila, wire, hemp (tarred and untarred), cotton, and flax are the materials used in the manufacture of rope which may be seen on board ships of the United States Navy. However, the use of hemp, cotton, and flax rope is limited. Wire rope is discussed in a subsequent chapter.

In making rope the fibers are twisted into yarns, which are, in turn,

twisted into strands. Several strands may then be twisted to form rope and several ropes to form a cable. Fiber rope is usually 3 or 4 strand.

To help prevent rope from unlaying, the successive twists are taken in opposite directions, as, yarns right-handed, strands left-handed, ropes right-handed, and cables left-handed.

FIBER ROPE

Fiber rope includes that made of Manila, hemp, cotton, and flax. It derives its name from the fact that it is made from plant fibers.

The fibers are separated from the pulpy part of the plant by appropriate mechanical processes, are put through a process of carding and spinning, and come out on long bobbins as yarns.

Manila is made from the abaca plant, and comes principally from the Philippines. Its use is general and most of the lines seen on board ship are of Manila.

Manila rope is frequently known as *Manila hemp,* but there is a great difference between it and "hemp," and seafaring men should not confuse the two.

Hemp is made from the hemp plant, which is most extensively raised in Italy, Russia, and the United States. American hemp is used for making lines used in the United States Navy.

Hemp rope is only seen as "small stuff" in the United States Navy, and is seldom used on merchant ships, except for standing rigging not made of wire, and then it is invariably tarred. Tar reduces the strength of the rope, but increases its life by protecting it from moisture.

Cotton and flax ropes are made of ordinary cotton and linen, respectively. In large sizes they are unsuitable for service aboard ship. Cotton rope is used for the taffrail log, lead lines, signal halyards, etc., and flax rope for boat lead lines. These ropes are frequently braided instead of being laid.

UNCOILING MANILA ROPE

The following practice with respect to uncoiling new coils of Manila rope should be followed:

Both fag ends of a coil are visible on one face of the coil and this is known as the front of the coil. The opposite end of the coil is known as the rear of the coil. On the front of the coil one fag end forms the last turn of the outside layer of the coil and the other fag end forms the first turn of the inside layer of the coil and is brought through the hole from the rear of the coil.

The proper method of uncoiling rope is to pull the inside fag end, *i.e.,* the fag end at the inside of the coil, from the front of the coil. The coil is thus in proper position for uncoiling when the front of the coil is face up. By this method the direction of uncoiling is counter to the direction of turn, *i.e.,* turn is taken out of the rope and kinking is avoided. The coil is in an incorrect position for uncoiling when the rear of the coil is face up. If an attempt is made to uncoil in this position by pulling the inside fag end, kinking will occur because the direction of uncoiling adds to the turn. The various instances of kinking in service which have come to the attention of the Boston Navy Yard were the result of uncoiling from the rear end of the coil in the manner just described. The matter of kinking is more serious in the larger sizes of rope because, when a kink has once formed, it is not possible to restore the distorted strands to their correct position. Tensile strengths of kinked ropes have indicated that a kinked section may be expected to fail at loads of from 20 to 30 per cent below the strength of a section which has not been kinked.

The location of the inside fag end at the front of the coil, as described above, refers to the past practice of the Boston Navy Yard in binding coils of larger sizes of Manila rope. This practice has not been followed with the smaller sizes, but the inside fag end has been found in its natural position at the rear of the coil. To uncoil the small sizes in which the inside fag end is at an opposite face from the outside fag end and has not been brought through the hole to the front of the coil as in larger ropes, reach through the hole of the coil from the front and grasp the inside fag end. In the future the Boston Yard plans to extend the inside fag end to the front of the coil in binding all sizes of rope. It is planned further to attach a tag to the inside fag end at the front of the coil bearing the notation "Draw from this end." In the meantime the above instructions should be followed in opening coils from stocks of Manila rope now on hand.

SMALL CORDAGE

Small cordage is usually known as *small stuff,* and may refer to line under 1¾ inches in circumference, although halyards, etc., are not usually regarded as small stuff. Its size is designated by the number of threads it contains, the largest being 24-thread stuff.

In addition to being described by the number of threads, different types of small stuff have specific names. The following are the most common varieties.

Spun yarn is rough and comparatively cheap. It is loosely laid up and left-handed, of 2, 3, or 4 strands. It is the most extensively used small stuff, being convenient for seizings, service, etc., where great neatness is not required. It is tarred.

Marline, 2-stranded, left-handed, has the same uses as spun yarn, but where neater work is required. Yacht marline, tarred, is used for small work in rigging lofts. Untarred marline is used for sennit, a braided cord or fabric made of the plaited yarns.

Houseline and roundline have the same uses as marline, the difference being that they are 3-strand. Houseline is left-handed and roundline right-handed.

Seizing stuff is used where a heavier, stronger, and neater material than any of the above is needed.

It is laid up by rope-making machines and is finished like larger rope. It is usually 3-strand, right-handed stuff, and may have 2, 3, or 4 threads to the strand, making 6-, 9-, or 12-thread seizing stuff. Tarred American hemp is the standard material used in making it.

Ratline stuff differs chiefly from seizing stuff in that it is larger, being issued in sizes from 6 to 24 thread, as 6-thread, 9-thread, 12-thread, etc.

Rope yarns, made by unlaying condemned, tarred hemp cordage, are very convenient for miscellaneous light, rough work. *Foxes,* two yarns twisted by hand or a single yarn twisted against its lay and rubbed smooth, make neater seizings than spun yarn. A good supply of rope yarn should be kept on hand.

SIZE OF FIBER ROPE

The size of fiber rope, except small stuff, is specified by the number of inches in its circumference, thus, a 6-inch Manila rope is made of Manila and is 6 inches around. It is made in sizes from ¾ inch to 16 inches, but 10 inches is the largest standard size issued to the United States naval service, and 8-inch is the largest size commonly seen.

Its length is given in fathoms, and it is issued in coils of 100, 120, 150, or 200 fathoms, dependent upon the size and type of rope, but American hemp, tarred, boltrope, is the only one issued in 100-fathom lengths, and no size of any rope larger than 2¼ inches comes in 200-fathom coils.

The specifications for standard rope which may be ordered show the type size, weight in pounds per fathom, length of coil, weight of coil, and breaking strain.

CARE OF FIBER ROPE

Unlike metal, fiber has not a permanent elastic limit within which it can be worked indefinitely. Therefore, it should not be attempted to put a maximum strain on a rope which has seen continuous service under a moderate strain nor on one which has once been close to the breaking point. The safety of a rope decreases comparatively rapidly with use, dependent to some extent upon the amount of strain. This is due to the fact that the fibers slip a small amount under each strain in spite of the twisting.

Rope shrinks in length when wet and unless allowed to do so freely subjects itself to a strain as great or greater than it would carry under a load. For this reason, lines which are belayed should be slacked when wet, otherwise, they will be weakened or even broken if they were very taut when dry.

Rope deteriorates quickly if allowed to remain damp. It should not be stowed unless perfectly dry, nor should it be covered in such a way that the moisture will be held in.

Hemp and Manila rope are lubricated when received. From 10 to 12 per cent of the weight is made up of oil which has been sprayed on. This assists in protecting the rope from excessive heat and moisture, and as the oil is lost the tendency of the rope to deteriorate increases.

Rope is quite an item of expense on board ship, and a great deal should be saved by care taken in handling it.

CARE OF FIBER RIGGING

Running rigging must always be slacked up in wet weather, as rope shrinks in length when wet and the rigging may become so taut as to part or carry something away. All running rigging should be slacked off at night as dew is sometimes heavy enough thoroughly to soak the lines.

Smoke-pipe guys should be slacked off when fires are lit off under the boilers to which the smoke pipes lead, as heat from the fires causes the smoke pipe to expand considerably.

Standing rigging is protected from the weather with a coating of tar oil and coal tar. The coating must be renewed at regular intervals.

All rigging must be gone over at frequent intervals to make sure that no part of it is deteriorating.

KNOTTING

Knotting is one of the things which cannot be learned well from a book, but some of the uses of the various knots can be learned and illustrations may be followed in practicing.

The tying and uses of the most common knots have been covered in Chapter 12.

Knots are divided into four general classes as follows:

(1) Knots in the end of a rope. These are for fastening a line upon itself or around some other object.

(2) Knots for bending two ropes together.

(3) Knots for securing a line to a ring or spar. These are all called hitches or bends.

(4) Knots worked in the end of a rope. These are fancy knots which finish off the end of a rope and also prevent its pulling through a ring. They are usually used on bell ropes, hand ropes, etc.

Knots in the end of a rope.—

Overhand knot .....
Bowline .....
Running bowline .....
Bowline on a bight .....
Cat's-paw .....
Sheepshank .....
Figure-of-8 .....
Single Blackwall hitch ...

These very important knots have been given in Chap. 12. They should be reviewed if they are not well know.

Double Blackwall hitch.—More secure than the single Blackwall, because two turns instead of one are taken around the standing part. It is not illustrated, but is used for quickly hooking a line to a hook by running the line through the curve of the hook, around the line to which the hook is attached, and then under itself at each of these places.

Bending two ropes together.—

Square knot .....
Granny knot .....

These knots are described in Chap. 12.

Sheet or *becket bend (single).*—A knot which is particularly good for use with small stuff and for joining lines of different sizes, since it does not weaken the rope. It is one of the most useful knots and can be used with any type of line. Because it is used for knotting yarns, it is known by landsmen as a *weaver's knot.*

Sheet bend (double).—A stronger tie than a single sheet bend, because the end of the bending line is passed twice around the standing line.

Single carrick bend .....
Double carrick bend .....
} These are similar to the sheet bends, but are seldom used. If they are used, it is best to stop the ends down.

Two bowlines.—A very quick, secure method of bending two lines together by the use of the dependable bowline. This is too bulky for use where the line is required to slip through something, as a chock.

Reeving line bend.—A neat and secure method of bending two lines together, but not adaptable to quick work. It will reeve through a chock.

Knots for securing a line to a ring or spar.—Hitches and bends are quickly tied, but have more of a tendency to let go, when the pull on them is slacked, than other knots do.

Timber hitch .....
Timber and half hitch .....
Two half hitches .....
Round turn and two half hitches .
Clove hitch .....
} These hitches have been covered in Chap. 12.

Studding-sail tack bend.—A useful bend which will not come adrift when the pull on it is temporarily relaxed. It works very well on sails where there might be danger of other types of bend losing their hold should the sails flap. Its name is taken from "stunsails," one class of sailing-ship sails which are very hard to handle if anything goes wrong with the gear.

Studding-sail halyard bend.—A bend which will not easily come adrift the greater the pull the more tightly it is jammed.

Fisherman's bend.—A knot for use as illustrated. More than one turn may be taken around the standing part to give added security. On account of being stopped down, it is not an emergency knot.

Rolling hitch.—This is a convenient method of bending a line to a spar or to the standing part of another line.

Knots, tied correctly, increase their grip as power is applied to them, yet are easily untied when not in use. Improper knots may slip at the crucial moment and, moreover, are very hard to untie once they have been jammed.

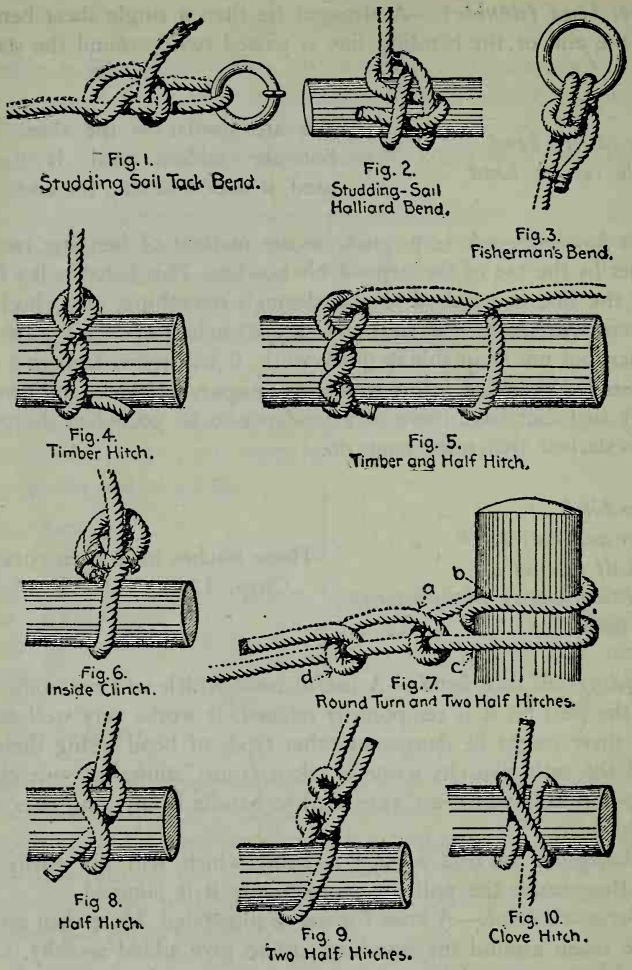


FIG. 34-1—Bending a rope to a post or spar (courtesy of D. Van Nostrand Company, Inc.).

MISCELLANEOUS METHODS OF SECURING

Stopper on rope.—Nonslip turns taken around any kind of rope or chain with another piece which is securely attached to some strong object. This will take the strain temporarily while securing, or may re-

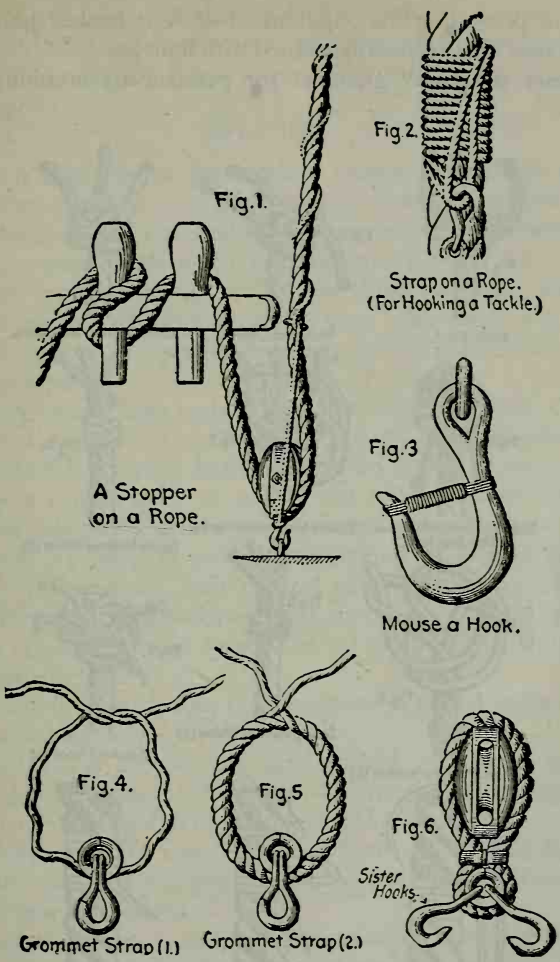


FIG. 34-2—Miscellaneous methods of securing (courtesy of D. Van Nostrand Company, Inc.).

enforce the hold on the line. Stoppers are used to hold a fall for a heavy boat, while securing the fall, on the anchor chains, etc.

Strap on a rope.—Turn taken around a standing part with a loop, through the bight of which a tackle may be hooked.

Mouse a hook.—A method of closing the open part of a hook

to assist in preventing the object to which it is hooked jumping out. Hooks on boat falls are usually moused with light line.

Grommet strap.—A grommet for permanently attaching a hook to a block.

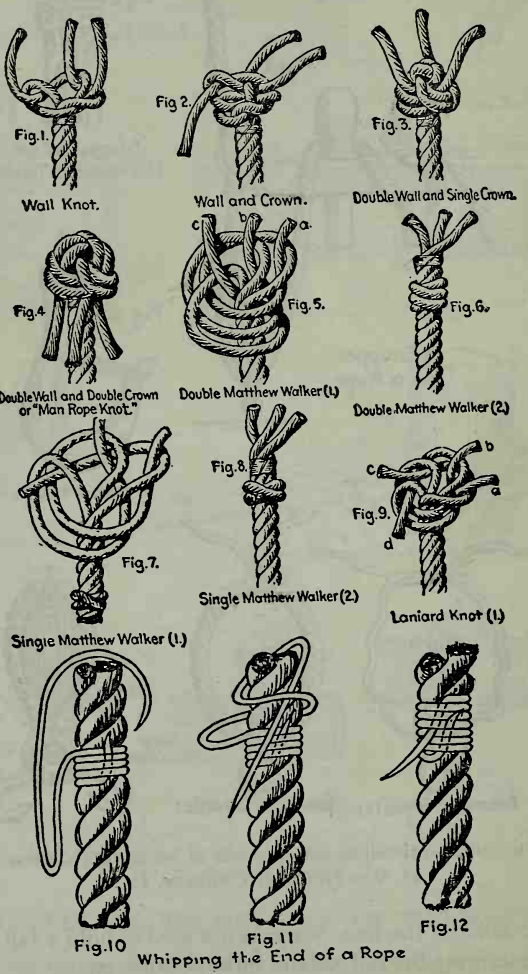


FIG. 34-3—Knots worked in end of rope (courtesy of D. Van Nostrand Company, Inc.).

Figure 34-3 shows a number of knots which are worked into the ends or body of a rope for various purposes, such as to prevent the ends from unreeving, to give a finish to the end, or merely for ornamental purposes.

SPLICING

Splicing is a method of permanently joining the ends of two lines or of bending a line back on itself so as to form a permanent loop. If properly done, it does not weaken the line, and a splice between two lines will run over a sheave or other object much better than a knot.

There are various forms of splices, the illustrated long splice, short splice, and eye splice. Splicing may be done with either wire or fiber rope, but wire rope is obviously harder to handle and is discussed in a succeeding chapter.

For a *short splice,* both ends of rope are unlaid for about a foot and the strands are interlaced, as shown in Fig. 34-4(5). Beginning with any one strand, it is tucked from *left* to *right,* the lay of the rope being opened by a marlinespike or one of the other pointed instruments shown. The other two strands are similarly tucked, but from *right* to *left.* Threads are then cut away from the ends of each tucked strand until they are two-thirds their original size, and they are then again tucked. After this, the strands are similarly cut away until they are one-third their original size, and a third and last tuck is taken. This produces a neat, tapered splice.

In splicing *4-stranded rope,* the first strand is tucked under two parts on the first tucking only.

An *eye splice* is done by the same method, except that the line is first brought back upon itself enough to give the desired size of eye, and the strands are then tucked into the body of the rope.

For a *long splice* the ends are unlaid farther than for a short splice and are then similarly interlaced. However, the procedure from then on is different and is as follows:

A strand of one piece, as a_1 in Fig. 34-4(8), is unlaid for quite a distance, and the corresponding strand of the other piece, b_1, is laid in the opening left by a_1. The remaining ends of A and B are twisted up together for convenience, the rope is turned end for end, and the first operation repeated with two other corresponding strands, as a_2 and b_2.

The remaining strands of each part, a_3 and b_3, are left at the original position. This leaves pairs of strands at three positions along the rope. Each of these strands is halved, two of these halves at each position,

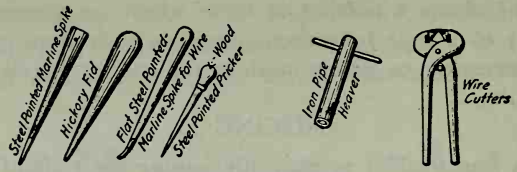


FIG. 1.
TOOLS FOR SPLICING

FIG. 2.
EYE SPLICE (1)

FIG. 3. EYE SPLICE (2)

FIG. 4.
EYE SPLICE (3)

FIG. 5.
SHORT SPLICE (1)

FIG. 6.
SHORT SPLICE (2)

FIG. 7.
SHORT SPLICE (3)

FIG. 8. LONG SPLICE (1)

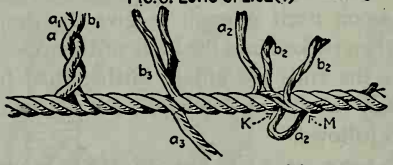


FIG. 9. LONG SPLICE (2)

FIG. 34-4—Splices, fiber rope (courtesy of D. Van Nostrand Company, Inc.).

as of a_2 and b_2, are tied together with an overhand knot, and the remaining two halves are tucked over one and under one of the full remaining strands of the rope. After all strands have been tucked, the loose ends are all trimmed off smooth. By this method a splice is secured which will run over a sheave easily and which is hardly noticeable.

SEIZING

Seizing is the process or operation of lashing two parts of rope together by continuous turns of small stuff. The seizing is then secured by a clove or other type of hitch. When two crossing parts of rope are bound, the seizing is a *throat seizing*.

Seizings are used in assisting to hold a rope loop around a thimble, retaining a loop in the center of a line, holding the short end of a hitch or bend to the main body of the line, fastening two sister hooks together, etc.

Seizing is illustrated in the fisherman's bend (Fig. 34-1 (3)).

WORMING, PARCELING, AND SERVING

Rope which is to be exposed to the weather or to exceptionally hard usage is protected by worming, parceling, and serving.

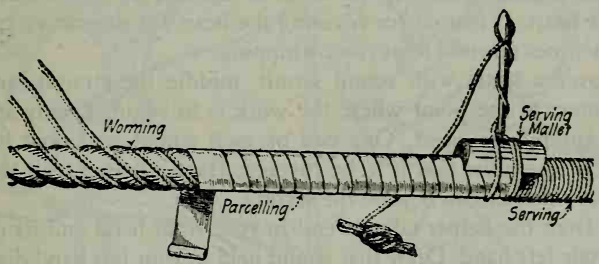


FIG. 34-5—Worming, parceling, and serving.

Worming consists in following the lay of the rope, between the strands, with small stuff, tarred, which keeps moisture from penetrating to the interior of the rope, and at the same time fills out the round of rope, giving a smooth surface for the parceling and serving.

Parceling consists in wrapping the rope spirally with long strips of canvas, following the lay of the rope and overlapping like the shingles on a roof to shed moisture.

Serving consists in wrapping small stuff snugly over the parceling, each turn being hove as taut as possible so that the whole forms a stiff protecting cover for the rope. A *serving mallet* is used for passing the turns; in serving, each turn is hove taut by the leverage of the handle, as illustrated:

Worm and parcel with the lay,
Turn and serve the other way.

Before starting to worm, parcel, and serve a line, it should be stretched taut at a convenient working height and in a place where free access may be had to its whole length. If the work is to be neat and effective, the material used must be well secured at the starting point and the line or canvas kept taut throughout.

PALM AND NEEDLE

Figure 34-6 shows four of the common stitches used in the Navy. The *round* stitch is used for making bags, serving, etc. The *flat* stitch is used for making seams on sails, tarpaulins, etc. The *baseball* stitch is used where a snug fit on canvas is required. The *herringbone* stitch is used on painted or very stiff canvas.

SENNIT

Round sennit is laid up of an even number of strands or nettles around a heart. It is used for covering the heart for decorative purposes. It is sometimes referred to as coachwhipping.

To cover a heart with round sennit, middle the strands, and seize their centers to the point where the work is to begin. Evenly space the strands around the heart. One end of each strand will now lie along the part of the heart that is to be covered. Have a helper tend the opposite ends, which extend beyond the seizing.

Now from the helper take an end in your right hand and its opposite end in your left hand. Draw that strand held in your left hand diagonally to the left along the heart and draw the part held in your right hand diagonally to the right, over the left-hand strand. Draw both parts moderately taut, and pass the part held in the left hand back to the helper. Then take the next pair of strands to the right and handle them likewise. Work around the heart, to the right, until all pairs have been handled as the first pair was handled.

When the round is completed, take a strand from the helper in your left hand, and the next lower-row strand to the left of it in your right hand. Draw the strand held in the right hand diagonally around the heart to the right, and the strand held in the left hand over the strand held in the right and diagonally along the heart to the left. Draw both strands moderately taut, and pass the strand held in the right hand back to the helper. Work around the heart to the left, handling each pair as the first pair was handled. At the completion of this round the ends that were originally tended by the helper will be again tended by him.

Work alternate rounds to the right and left, as above explained, until

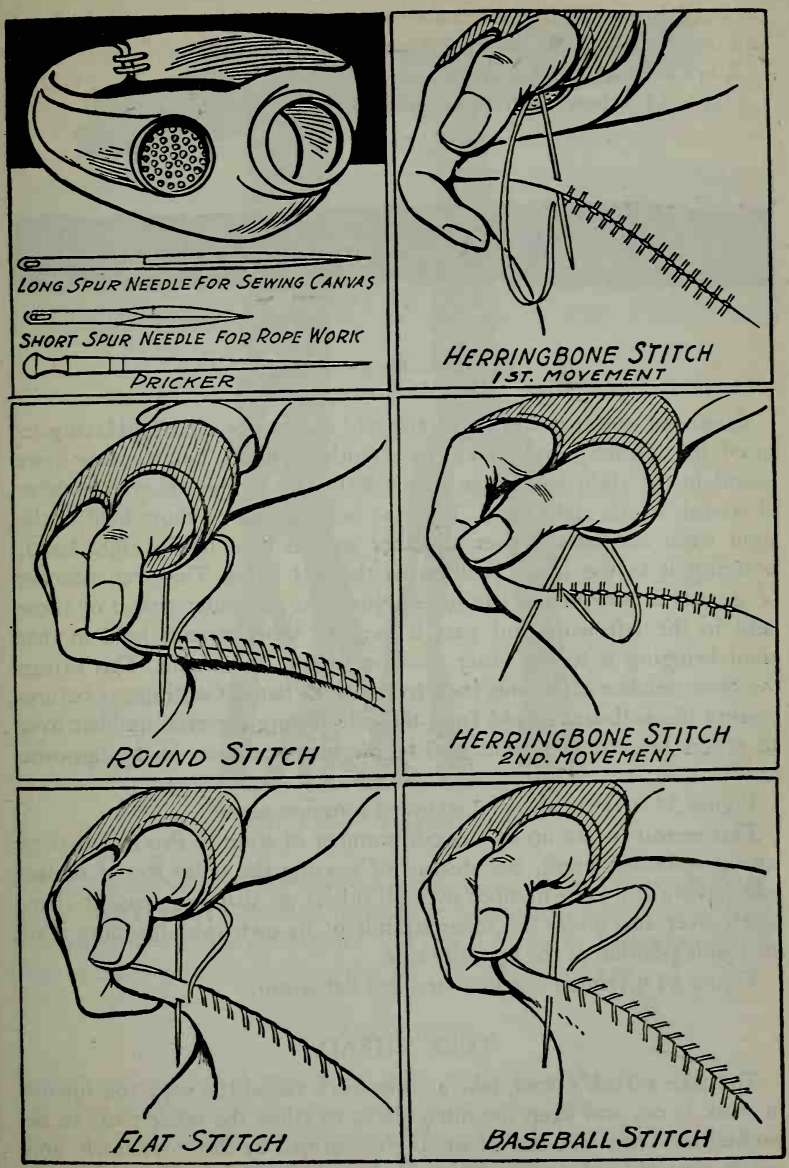


FIG. 34-6—Four of the common stitches used in the Navy (courtesy of Cornell Maritime Press, Inc.).

the heart is covered to the required point. Put a seizing around the heart and the strands at this point, and cut off the ends.

Work a Turk's-head over the seizings.

Figure 34-7 shows method of laying up round sennit.

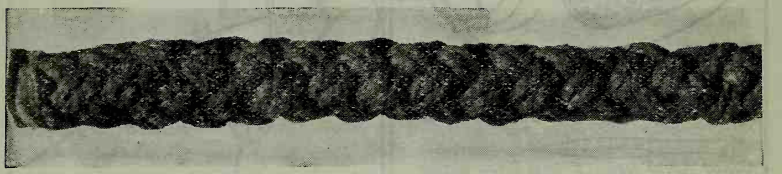


FIG. 34-7—Round sennit.

Common sennit is laid up of any odd number of strands. Having secured the standing ends, take the strands in hand, holding one more strand in the right hand than in the left. This brings an even number of strands in the right hand. Take the outer strand of those held in the right hand and pass it over all other strands held in the right hand, bringing it to the inner position in the left hand. The even number of strands is now in the left hand. Now take the outer strand of those held in the left hand and pass it over all other strands held in that hand bringing it to the inner position in the right hand. This brings the even number of strands back to the right hand. Continue as before, passing the outboard strand from the side having the even number over all others held in that hand, and to the inner position in the opposite hand.

Figure 34-8 (left) shows 7-stranded common sennit.

Flat sennit is laid up of any odd number of strands. Proceed as if to lay up common sennit, but instead of passing the outer strand of the side having the even number over all others on that side, pass it alternately over and under the other strands of its own side, bringing it to the inside position of the opposite side.

Figure 34-8 (right) shows 7-stranded flat sennit.

TURK'S-HEAD

To make a Turk's-head, take a clove hitch round the rope you intend to work it on, and keep the hitch slack, to allow the other parts to be worked in. Then take one of the bights formed by the clove-hitch, and put it over the other; pass the end under, and up through the bight

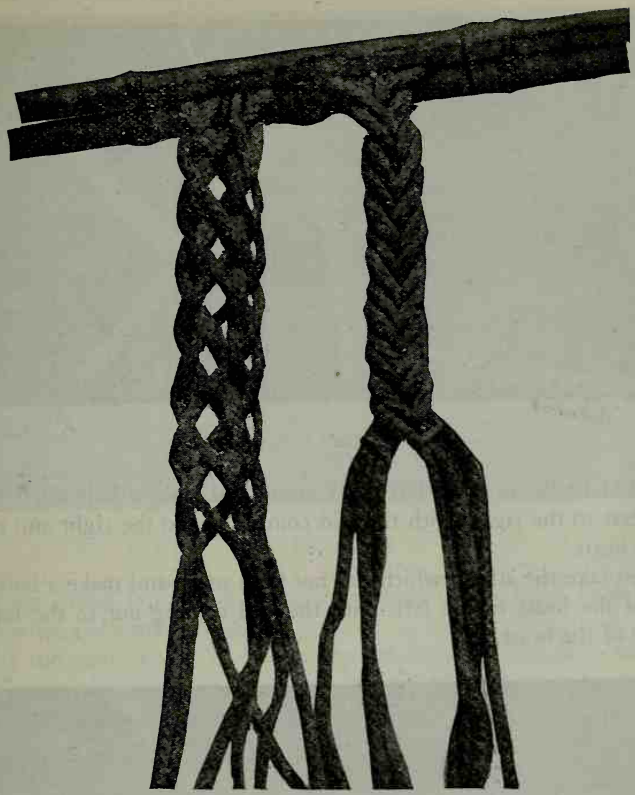


FIG. 34-8—7-stranded sennit.

which is underneath; then cross the bights again, and put the ends round again, under, and up through the bight which is underneath; after this, follow the lead of the other parts, and it will form the Turk's-head with three parts to each cross (See Figs. 34-9 to 34-12 inclusive).

COXCOMBING

Seize the ends of 3 strands of small stuff along the heart, allowing 2 parts to hang on the right and 1 on the left of the heart.

Take the strand on the extreme right and make a half hitch around the heart, with the end coming out to the left and on top of the heart.

FIG. 34-9.

Next take the original left-hand strand and make a half hitch around the heart to the right, with the end coming out to the right and on top of the heart.

Then take the strand which has not been used, and make a half hitch around the heart to the left, with the end coming out to the left and on top of the heart.

FIG. 34-10.

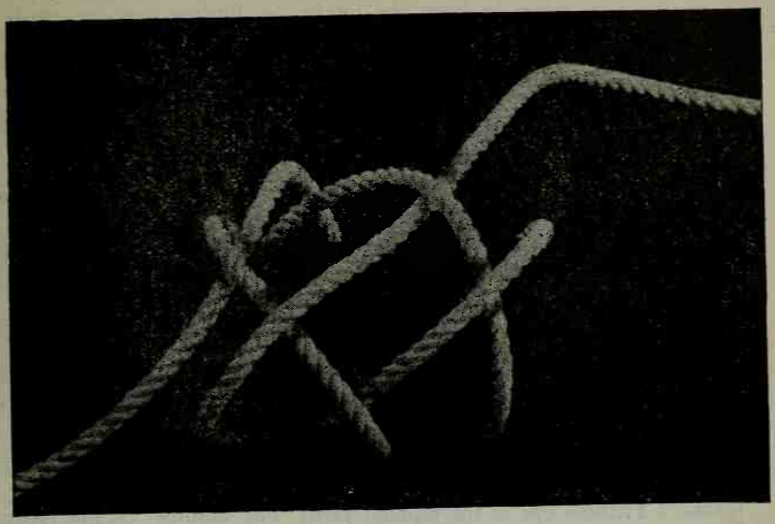


FIG. 34-11.

Each strand is now on the opposite side of the heart from which it was when the work started.

In the same order as before, but starting on the left, make half hitches in the 3-strands, bringing the end of each back to its original side of the heart.

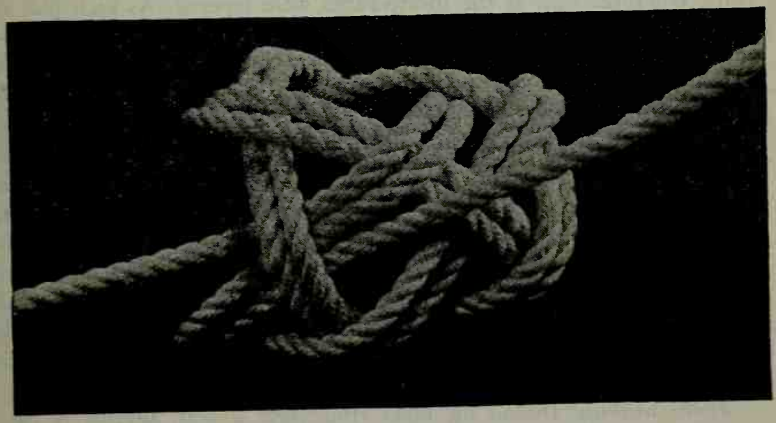


FIG. 34-12.

Care must be taken to keep the hitches in line as they are made. Continue hitching strands in succession until the heart is covered.

POINTING ROPES AND HAWSERS

Put on a whipping at a distance from the end to be pointed equal to 6 times the circumference of the rope. Suspend the end at a convenient working height. Unlay the strands below the whipping. Then unlay the yarns. Cut off the heart below the whipping.

Just below the whipping, turn up the layer of yarns that form the outside layer of the rope and secure them out of the way. The number of these outside yarns turned up must be a multiple of 4, so that, when later they are laid up into 2-yarn nettles, the number of nettles will be even. If double nettles are to be used, the number of yarns turned up must be a multiple of 8 in order to form an even number of pairs of 2-yarn nettles.

Next tease out and taper the inside yarns by unlaying each separately and combining with a dull knife blade.

Make a Flemish eye in the tapered yarns. The shoulder of the Flemish eye should be about $1\frac{1}{2}$ times the circumference of the rope below the whipping.

Marl down the tapered yarns between the whipping and the shoulder of the Flemish eye, forming the taper of the point. Use light strong material for marling down the taper. A thread drawn from a signal halyard sennit makes excellent material for this.

Next bring the outside layer of yarns down and tease them out by pairs, tapering them as the inside yarns were tapered. As each pair is tapered, lay them up into 2-yarn nettles. Tapered nettles offer the advantage that none has to be dropped as they are laid up toward the Flemish eye, where the circumference of the tapered point is small.

Having laid all outside yarns into nettles, turn one nettle up and one down, alternately. Have a helper tend the row of nettles that is turned up. Evenly space and draw the lower row of nettles along the tapered point. Use marline for filling. Secure the filling with a timber hitch around the lower row of nettles, close up against the bight of the nettles that were turned up. Take two turns of filling around the lower row of nettles, then pass the end of the filling down under these turns and haul them taut, jamming the turns. Let the end of the filling, which is coiled or rolled into convenient working shape, hang parallel to the taper.

Then, working around the taper from right to left, alternately pass

a lower row of nettles to the helper, and receive an upper row of nettles from him. Draw what is now the lower row of nettles down along the taper. Bring the bight of the filling out between two of them, take two turns around this row of nettles, close up against the bights of nettles that are turned up. Secure these two turns as the first two are secured.

Repeat the instructions contained in the above paragraph, until the taper is covered down to the shoulder of the Flemish eye, where the last turns of filling are carefully secured, and the ends of nettles and filling are cut off. The result looks much like a sword mat around the tapered point.

Coxcomb the Flemish eye, then work a Turk's-head over the shoulder of the Flemish eye, covering the ends of nettles and coxcombing with the Turk's-head.

If the rope's end is to be cross-pointed, proceed as for pointing until alternate nettles are turned up and down. No filling is used in cross-pointing. Lay up round sennit of the nettles, using the tapered point for the heart.

A more substantial finish at the lower end of a cross-pointed hawser is made by inserting a filling a few inches above the Flemish eye, and straight pointing the last few inches.

Where it is desirable to have the sennit show plainly, alternate pairs of nettles are turned up and down, and round sennit laid up of pairs instead of single nettles.

Figure 34-13 shows a rope's end cross-pointed with single nettles.

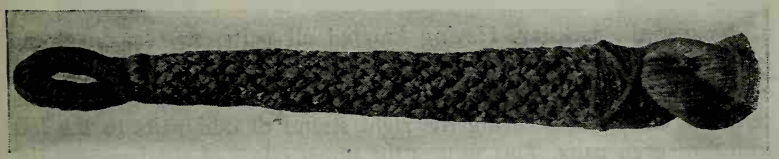


Fig. 34-13.

POWER-BOAT TRIMMINGS

Trimmings and curtains for power boats, and fancy curtains in general, are made by pulling threads from the warp of canvas, and hitching or knotting the threads thus exposed, or by hitching and knotting strands of small stuff suspended from a jackstay.

Lace made of sennit, hitches, and knots in the end of strands is commonly called *MacNamara* lace. An indefinite number of designs may be worked by dropping or skipping strands according to the fancy of the maker of the lace.

One method of laying up MacNamara lace is to middle a number of strands, or yarns, and secure their bights to a jackstay which has been secured to a convenient height for working, allowing the ends to hang down. Secure the bights with lanyard hitches, and put as many bights on the jackstay as the width of the lace requires. Then starting at the left, square knot each pair of ends together, drawing the knots close

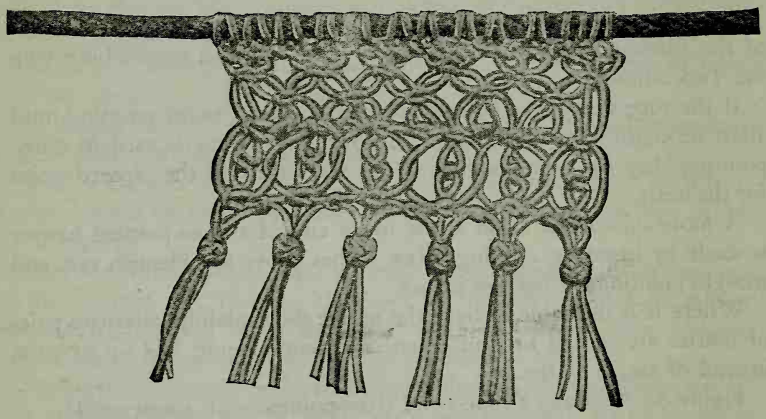


FIG. 34-14—24-strand MacNamara lace.

up against the jackstay. Having knotted all pairs, start again at the left, skip the extreme left strand and square knot the right-hand strand of the first pair to the left-hand strand of the second pair. Continue across to the right, securing the right strand of odd pairs to the left strand of even pairs. This secures the upper edges of the lace, and the jackstay may be withdrawn after the lace is finished, without it falling adrift.

Having knotted all pairs together, start again at the left, and square knot the first strand to the second, the third to the fourth, and so on.

Next square knot the first and fourth strands together, with the second and third strands hanging through the knot. Then knot the fifth and eighth strands with the sixth and seventh strands through the knot. Continue across from left to right handling each set of 4 strands as the

first 2 sets were handled. Then, starting again on the left, skip the first two strands, and square knot the third and sixth strands together, allowing the fourth and fifth strands to hang through the knot. Square knot the seventh and tenth strands around the eighth and ninth in a like

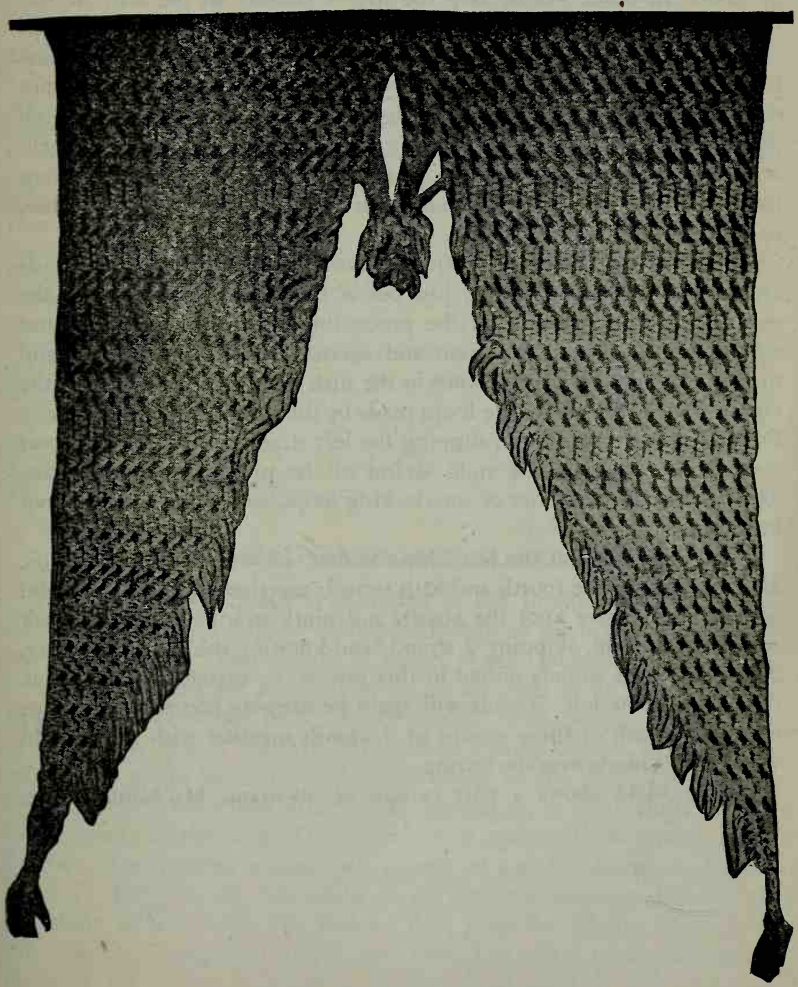


FIG. 34-15—40-strand MacNamara lace.

manner. Continue across to the right, knotting the first and last strands of each 4 strands around the second and third of that set.

Next, starting at the left, tie together with square knots all pairs of strands that passed through the square knots of the preceding row of knots. In other words, skip the first 3 strands on the left, tie the fourth and fifth together, skip the sixth and seventh, tie the eighth and ninth together, and so on across to the right. The strands will now hang naturally in groups of 4. Start again at the left, and square knot the first strand to the fourth, with the second and third strands through the knot, as was done with the fourth row of knots. Then start again at the left. Skip the first strand, square knot the second to the third, skip the fourth and fifth strands, square knot the sixth and seventh together, and so on across to the right.

Next, starting at the left, square knot the first and fourth strands around the second and third, just below the square knot made in the second and third strands, in the preceeding row. Then the fifth and eighth strands around the sixth and seventh, passing the fifth strand through the bight above the knot in the fifth before knotting it with the eighth strand. This locks the loops made by this last row of square knots. Proceed across to the right, dipping the left strand of each knotted pair through the bight in the right strand of the preceding knotted pair. The result will be a series of interlocking loops, each with a square knot in its center.

Next, start again at the left, skip the first, second, and third strands, and square knot the fourth and fifth strands together; skip the sixth and seventh and square knot the eighth and ninth strands together. Work across to the right, skipping 2 strands and knotting the next 2 together. There will be 3 strands united in this row at the extreme right, just as they were at the left. Strands will again be hanging naturally in groups of 4. Seize each of these groups of 4 strands together with thread, and work Turk's heads over the seizing.

Figure 34-15 shows a port curtain of 40-strand MacNamara lace.

CHAPTER 35

DUTIES OF SEAMAN WATCHES, UNDER WAY AND AT ANCHOR

Masthead and deck lookouts 405
Life-buoy lookouts 407
Special lookouts 407
Engine-order telegraph 408
Breakdown and man-overboard signal watch 410
Speed-cone watch 411
Night-speed-indicator watch 412
Flag-speed-indicator watch 413
Fog-whistle and fog-bell watch 414
Fog-buoy or towing-spar watch 415
Duties of the various messengers 415
General duties of a sentry 416
General duties of an orderly 418
Side boys 418
Sweepers 420
Side cleaners 420
Jack-o'-the-dust 421
Anchor watch 421
The watch at sea 423

MASTHEAD AND DECK LOOKOUTS

The masthead lookout is stationed in the foretop except that on destroyers and small ships he is frequently kept on the bridge. This lookout is maintained from sunrise to sunset at sea. Lookouts are relieved every 2 hours and are required to be on the alert at all times during their watch. Lookouts must report vessels, land, rocks, shoals, discolored water, buoys, beacons, lighthouses, floating objects, or anything else which might be of interest to the officer of the deck. This report is made over a voice tube direct to the bridge, or, in small ships, direct to the officer of the deck. The procedure in making these reports is as follows: The lookout makes such reports as *Sail ho, Land ho, Lighthouse ho, Buoy ho,* etc. The officer of the deck acknowledges this report by asking *Where away.* The lookout then gives the relative bearing of the object as *Two points on the port bow.* The officer of the deck may then ask for further information on the object sighted, and the lookout will describe it as briefly and clearly as possible. The *general or-*

ders for lookout are as follows, and all men must know them thoroughly:

(1) Be alert and attentive.

(2) Do not give your attention to anything but your own special duty.

(3) Remain at your station until you are regularly relieved. At sunset you can expect orders from the officer of the deck or boatswain's mate of the watch, *Lay down from aloft.*

(4) Keep your feet and do not lounge.

(5) Do not talk with others except as required by your duty.

(6) When making a report, speak loudly and distinctly.

(7) Repeat a hail or a report until it is acknowledged by the officer of the deck.

(8) When you are stationed, be sure that you understand what you are supposed to do. If you don't understand your duty, ask the petty officer who stations you about it.

(9) Remember that, no matter what your station, your duties are important and most necessary. According to the manner in which you perform your duty, you may make yourself of great assistance or absolutely worthless to the officer of the deck.

The masthead lookouts are usually brought down to the bridge at sunset, one to each side of the bridge. The duties on the bridge are the same as for the masthead lookouts, except that they keep watch only on their respective sides. They also watch the running lights and report immediately if they burn dimly or go out. Each half hour, on the bell, if it strikes, they observe that their lights are burning and then pass the hail, *Starboard light, bright light,* followed by *Port light, bright light.* The starboard bridge lookout is, as a rule, detailed to report the masthead light also. In this case he reports, *Masthead, bright light,* in addition to his other report.

The port lookout usually is detailed to report the range light similarly. A dim light will be seen quicker at night by looking at the sky a little above the horizon than by looking directly at the horizon. The lookout should sweep the horizon, then sweep the sky just above the horizon. A lookout at night must stand in the dark and must not have any light shine directly in his eyes, nor should there be any bright light forward of him.

Since watching for things is his primary duty, the lookout should see anything that happens, outside the ship, before anyone else. Until he can report things before others see them, he cannot feel that he is

"right on the job." Every occurrence should be reported, even if it is believed that it has already been seen by the officer of the deck, and it is better to report too many things than to make the mistake of not reporting something because it is believed that it has already been seen or that the officer of the deck would not be interested.

Note.—Relative bearings are measured in points of 11¼° each, from the bow, abeam, and the stern. They will be covered under steerings.

LIFE-BUOY LOOKOUTS

The life-buoy lookouts keep station at their respective life buoys and drop them on order from the officer of the deck, or, in the absence of orders, drop them as near as possible to the man who is overboard, but care must be taken not to drop the buoy on the man. If the buoy is dropped without orders, he should repeatedly call *Man overboard!* In fact, any one seeing a man over the side should call *Man overboard!* As soon as the buoy is let go, lookouts should endeavor to keep the man in sight. Do not sacrifice the chance of getting the buoy close to the man by waiting too long for orders from the officer of the deck; he may not know that a man is overboard, or may be too busy preparing to rescue him to issue the order immediately.

A wide-awake life-buoy watch can do much to save the life of a shipmate, who might otherwise be drowned, and it is therefore very important that he pay strict attention to his duty at all times.

SPECIAL LOOKOUTS

Special lookouts are often prescribed in case of fog or thick weather, with stations and duties as follows:

Starboard bow.—Watch fog buoy of ship ahead and keep lookout on starboard bow.

Port bow.—Watch fog buoy of ship ahead and keep lookout on port bow.

Starboard bridge lookout.—From ahead to abeam.

Port bridge lookout.—From ahead to abeam.

Starboard quarter and astern.—To watch ship's own fog buoy and keep lookout aft.

Port quarter and astern.—To watch ship's own fog buoy and keep lookout aft.

Foretop lookout.—Duties same as masthead lookout and also as

specially ordered. This lookout is to report immediately if any land, vessel, buoy, or anything else is sighted, or if any bell, whistle, gun, or other sound is heard. Reports will be made by voice tube or telephone to the bridge or by singing out when the case is urgent. The lookout in the bow is an especially important station.

Often in a heavy fog the lookout on the forecastle can see much farther than any one on the bridge and his station in the bow is away from the whistle and the noises on the bridge. No unnecessary noise should be permitted near him. He must listen for all he is worth and report the *first sound* he hears, for if he waits to hear a faint whistle grow louder, the ship will often be in serious danger before the second sound is heard.

Battle lookouts.—In time of war and in battle problems battle lookouts are stationed in the top and secondary battery control stations. Sixteen men are on watch at one time on large ships; the first one looking only in the direction from dead ahead to 2 points on the starboard bow; the second, from 2 points on the starboard bow to broad on the starboard bow; the third, from broad on the starboard bow to 2 points forward of the starboard beam, and so on all the way around the ship. The direction which one lookout has to cover is called his arc; the second man above described has arc 2. In reporting an object this lookout would merely say what he sees and what number arc it is in, thus *Wake of periscope, arc 2.* This system of lookouts may be altered to meet special conditions. Lookouts are usually in communication over the JL, battle lookout, or 1JV, maneuvering telephone circuits, as well as by voice tube.

ENGINE-ORDER TELEGRAPH

On the conning platform is an instrument called an engine-order telegraph; its purpose is to communicate to the engine-room the orders of the officer of the deck in regard to speed. The telegraph is circular in shape, and the various sectors are marked *full speed, standard speed, two-thirds speed, one-third speed, ahead; stop, one-third speed, two-thirds speed, and full speed, astern.* A lever, fitted with an indicator, travels over the circumference of the circular face of the instrument. If you are stationed at the engine-order telegraph, your duty is to move this lever to indicate the speed designated by the officer of the deck and to see that the answering pointer on the instrument moves to indicate the same speed; this shows that the engine-room has received and understood the signal. If the signal is not answered instantly from

the engine-room, move the lever again, bearing in mind the fact that you must use a little muscle in order to operate the lever properly; if the engine-room still fails to answer, report immediately to the officer of the deck.

If there is doubt as to which sector the answering pointer is in, ring the signal again, and you should always be careful to have your pointer near the center of the sector of desired speed. *It is most important that every signal for a change of speed go to the engine-room the instant it is ordered.* If you are detailed for a watch at the engine-order telegraph, don't be afraid to ask questions; be sure that you understand your duties, for the safety of the ship may depend upon the promptness and accuracy with which you execute orders. Never lean against the telegraphs and never touch them without orders from the officer of the deck. When an order for an engine is received, always repeat it aloud so that the officer of the deck is sure you have it right, and at the same time give the signal on the telegraph. As soon as the engine-room has answered this signal report immediately. As an example, the officer of the deck orders *Starboard engine, ahead, two-thirds.* Place the telegraph on two-thirds repeating *Starboard engine, ahead, two-thirds.* When the engine-room answers to two-thirds ahead, report *Starboard engine answered ahead two-thirds, sir.*

In ringing up changes of speed, do not yank the handle. Sudden pulls may break the chains and disable the telegraph. However, a full swing must be made with the pointer, otherwise the warning bell may not ring in the engine-room; it is not advisable to just ease the handle from *one-third ahead* to *stop,* etc.

In case of casualty in the engine-room, the speed may be changed by the engine-room watch without orders from the officer of the deck. In this case they will "ring up" this change in the same way you do on the bridge, and the indicator pointer will show it. This or any other change in the telegraph must be immediately reported to the officer of the deck and answered on his orders. Failure to do this might result in collision, loss of control of the ship, or serious trouble for the ship astern.

In addition to the engine-order telegraph, there are usually emergency bell pulls on the bridge, one on small ships and one for each engine on the larger ships. In case of casualty to the telegraph, this may be used to indicate the speed desired by the number of bells rung. The meaning of each number of bells is usually shown on a plate adjacent to the pull and should be memorized by the man who has a telegraph

watch, because it may be very important that he be able to use it promptly and properly in an emergency.

The importance of getting a change of speed to the engine-room immediately can be recognized by the fact that the orders to the telegraph are given so as to facilitate this. First, the engine to be used is stated, to get the attention of the man on the telegraph; then, the direction of motion follows, so that the handle may be moved at once; and after that the amount of speed desired; as, *Port engine, ahead, two-thirds; All engines, stop; Starboard engine, back, one-third;* etc. It will be noted that the orders are so worded as to avoid confusion; that is, *All* is used to mean "the engines in use" in place of *Both,* for two, because this might be confused with *Port; Back* is used in place of *Astern* to avoid the possibility of mixing *Ahead* and *Astern,* both starting with *A.* All these things only emphasize how necessary it is for the man on the engine telegraphs to know his job, and to perform it well. The bridge may also have communication with the engine-room over the 2JV telephone circuit in times of possible emergency, *e.g.,* when the ship is maneuvering or is passing through narrow waters such as a channel.

Note.—Destroyers and small ships have only one engine-order telegraph, with the handle for the corresponding engine on the starboard and port sides of it. All ships of new construction are equipped with electrical transmission systems for both the engine-room telegraph and stand-by apparatus. They should be operated in accordance with existing instructions posted on board ship.

BREAKDOWN AND MAN-OVERBOARD SIGNAL WATCH

The breakdown flag, the numeral 5 flag, is kept rounded up at the foremast of a ship in formation, ready to break in case of accident to machinery or steering gear. Also, in case of man overboard, the flag is broken and *lowered part way,* but not below the level of the smokestacks.

During daylight, a man is stationed at the halyards of this flag, ready to break it when ordered to do so by the officer of the deck. He must keep watch to see that the flag does not blow out of its own accord. If this flag breaks accidentally, the *negative* flag should be hoisted at once and before the 5 flag is hauled down. At night, 2 red lights arranged vertically are turned on for breakdown. These lights flashed and a gun fired means man overboard, but there is no signal gun on destroyers and small ships.

The 5 flag is yellow with a blue diagonal cross, and it is rounded

up, when it is kept rolled, by having pieces of light line tied around it. These pieces may be broken by a smart jerk on the halyard, which allows the flag to fly free.

SPEED-CONE WATCH

A speed cone is a canvas cone painted yellow; its purpose is to indicate to other vessels in the formation the actual speed that a ship's engines are making. The cones are hoisted at the fore yardarms of vessels in formation. The different positions of the speed cone indicate speeds as follows (see Fig. 35-1):

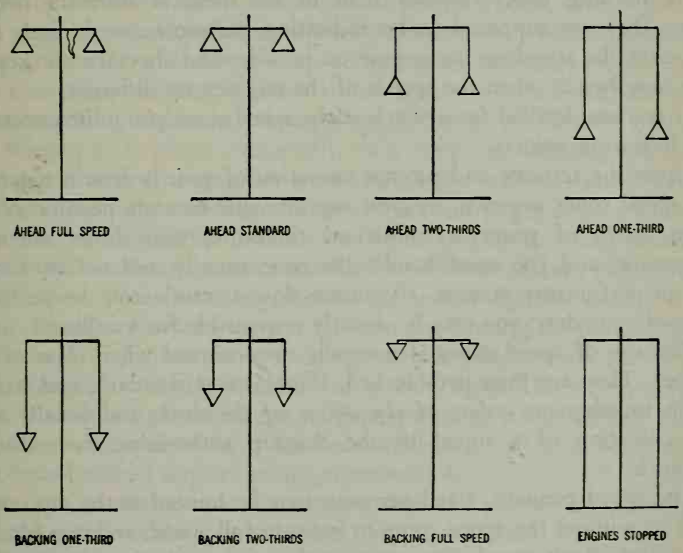


FIG. 35-1.—Speed cones.

Point up.—(1) Two-blocked: *Going ahead at standard speed.*

(2) About two-thirds up to yardarm: *Going ahead at two-thirds standard speed.* (Cone should show well clear above bridge.)

(3) About one-third up to yardarm: *Going ahead at one-third standard speed.*

Point down.—(1) Two-blocked: *Engines backing full.*

(2) Hoisted about two-thirds up to yardarm: *Engines backing two-thirds.*

(3) About one-third up to yardarm: *Engines backing one-third.* The cone lowered out of sight: *Engines stopped.*

In case speed cones are used on both yardarms, the two men should lower and hoist their speed cones together and should be sure that they are at the same height when hoisted to indicate the same speed.

Most speed-cone halyards have markers for speeds of one-third and two-thirds. A speed cone will be at the proper height for a particular speed when that speed's marker is at the level of the bridge rail or some other designated place. This has a tendency to keep the cones together, but they should be checked and leveled off as necessary because nothing looks sloppier than to see them at different heights when they are supposed to be indicating the same speed. Each cone indicates the speed of the engine on its side, and they are not kept at the same height when the speeds of the engines are different.

If you are detailed for a watch at the speed cone, you must remember the following points:

Upon the accurate and prompt execution of your orders in regard to the speed cones depends, in great measure, the accurate position of the ships astern of yours in formation; therefore, your duties are most important, and you must handle the cone smartly and not in a careless or perfunctory manner. If you are slow or careless in the performance of your duty, you may be directly responsible for a collision.

The use of speed cones is normally discontinued when clear of the harbor. They are then two-blocked, if not set at standard, and hauled down together *on orders of the officer of the deck.* and usually with the execution of a signal by the flagship authorizing their discontinuance.

The speed pennant, a red pennant, may be hoisted at the dip, either with or without the speed cone, to indicate full speed, and two-blocked to indicate flank speed. The pennant flies fore and aft, with the long edge fore and aft, and not up and down.

NIGHT-SPEED-INDICATOR WATCH

The night-speed-indicator consists of a double electric lamp at the main truck, showing red or white. At night it takes the place of speed cones. The meanings are as follows:

White light.—Steady light: *Going ahead at standard speed.*

Single flashes: *Going ahead at one-third standard speed.*

Double flashes: *Going ahead at two-thirds standard speed.*

Four flashes: *Going ahead at full speed.*

Five flashes: *Going ahead at flank speed.*

Red light.—Steady light: *Stopped* (in emergency, toots for 10 seconds with steam whistle also).

Single flashes: *Engines backing* (in emergency, 3 blasts with steam whistle also).

Double flashes: *Engines backing at full speed* (in emergency, 3 blasts with steam whistle also).

The controller for the speed light is located on the conning platform. By leaning against the controller, it is possible to switch a light on or off without orders. You would thereby become responsible for throwing the ships astern of you out of proper station, even if you did not cause an actual collision. Therefore, never lean against the truck-light controller and always keep on your feet and alert. Never touch the controller without a direct order from the officer of the deck, unless standing orders have been given to change it whenever orders to the telegraph are given. Frequently, on a destroyer, the telegraph watch operates it after changing his annunciators and without further orders.

The speed-light controllers of destroyers and larger ships contain an automatic apparatus for flashing the lights so that it is only necessary to put the handle at the place marked "STANDARD AHEAD, TWO-THIRDS, STOP, BACK," etc., in order to show the proper light or flashes at the truck. On all controllers there is a button for flashing the light by hand. Likewise all of them have a change switch which sends the current to a screened speed light instead of a truck light. The screened speed light is a white light which can shine only through a tube directly astern. It is mounted on the mast or another suitable place aft, and, being white, one cannot make a stop or backing signal with it.

In time of war or in a war game, a ship will put out all other lights and run with only the screened speed light, if any at all.

Automatic controllers have red and white pilot lights on them, which flash with the speed light. These and the speed light itself, if possible, should be watched to see that the speed set on the controller is being indicated.

The fore truck has a light which may be used for speed signals, but only in case of failure of the regular speed light.

FLAG-SPEED-INDICATOR WATCH

During daylight, the speed of ships steaming in formation is indicated by the use of small flags. On large ships one of these flags is flown from each wing of the bridge; on destroyers one only is flown,

and usually just to starboard of the mast and above the level of the flying bridge.

Flag speed indicators show the speed to the nearest knot, although destroyers sometimes use the answering pennant, under the indicator, to show half-knot speed.

When used as a speed-flag indicator, the international alphabet flags represent speed in knots, as shown by the numerals set opposite them in the following table:

D– 4 or 24	N–14 or 34	X—Slowing radically. (To be displayed momentarily to indicate speed reduction when the indication might otherwise not be clear.)
E– 5 or 25	O–15 or 35	
F– 6 or 26	P–16 or 36	
G– 7 or 27	Q–17 or 37	Y—Backing.
H– 8 or 28	R–18 or 38	Z—Less than 4 knots; or stopped.
I– 9 or 29	S–19 or 39	
J–10 or 30	T–20 or 40	
K–11 or 31	U–21 or 41	
L–12 or 32	V–22 or 42	
M–13 or 33	W–23 or 43	

Speed flags are very important to the ship astern and must be changed promptly and accurately. If possible, the flags should be changed before the new speed is given to the engine-room of your ship, to enable the next ship astern of yours in the formation to catch the change of speed at the same time.

The rack in the speed-flag bag usually has the letter and corresponding speed marked on it, over the slot in which that particular flag hangs. However, to stand intelligently a speed-flag watch the appearance and name of each flag, with the speed it indicates, must be learned, as the flags must be stowed and may get in the wrong slot. They must be checked before hoisting to prevent the wrong flag being hoisted through faulty stowage or otherwise.

FOG-WHISTLE AND FOG-BELL WATCH

In fog, mist, falling snow, or heavy rainstorms, whether by day or night, a steam vessel having way upon her is required by Rules of the Road to sound at intervals of not more than 2 minutes a prolonged blast (4 to 6 seconds' duration) on the fog whistle. A steam vessel *under way, but stopped and having no way upon her,* is required to sound at intervals of not more than 2 minutes *two* prolonged blasts, with an interval of about 1 second between.

In the United States Navy these signals are usually made at intervals of 1 minute and by a stop watch, except that in formation the

leading ship sounds the signal first and the others follow in succession, with sufficient interval between to prevent 1 blast from each of 2 ships sounding like 2 blasts from 1 ship, or similar confusion.

If you are detailed for the fog whistle, report on the bridge immediately and carry out any instructions that may be given you. Remember that if you are not strictly attentive to duty you may be directly responsible for a collision.

At anchor the ship's bell is rung rapidly for about 5 seconds, at intervals of not more than 1 minute. A man is detailed for this watch at the fog bell; his duties are explained to him and he must carry them out carefully and conscientiously. If other men-of-war are present or expected, it is customary to strike the ship's call letter each time the bell is rung. This is done in International Morse Code, one stroke of the bell indicating a dot, and a double stroke a dash.

FOG-BUOY OR TOWING-SPAR WATCH

The fog buoy, also known as the position buoy, is an object which may be easily towed and will throw a visible spray. When cruising in formation in a fog this type of buoy may be used by each ship to assist the ship astern in keeping position. Unless orders are given to the contrary, it is towed astern with the length of the tow line 10 yards less than the amount of open water between ships at correct standard distance. For instance, if standard distance is 500 yards (stated as from foremast to foremast) and the ship is 600 feet in length, the open water would be 300 yards and the fog-buoy towline would be 290 yards or 145 fathoms long. The line is usually marked by a colored rag which serves to indicate when a sufficient length of line has been paid out. When this rag comes to the taffrail, the towing spar should be in proper position astern.

As a rule, a petty officer and two men handle the spar and line. A point to remember is that in case a vessel backs, the line must be reeled in promptly, without waiting for orders, or the line is liable to be cut. A searchlight is usually kept turned on the spar, by day or night, to assist the next ship astern in formation in seeing the buoy. Lookouts are posted as mentioned before to keep watch on the towing spar of their own vessel and that of the ship next ahead.

DUTIES OF THE VARIOUS MESSENGERS

A seaman, second class, is usually detailed as messenger to carry messages for the officer of the deck. He must familiarize himself with

the correct names of the various parts of the ship and with the names and duties of various officers and petty officers so that he may be able to carry messages intelligently; he must also know thoroughly the customs of the service, as he will often be thrown on his own resources.

In carrying a message, he should always move on the run. If called upon to strike bells, he should strike them quickly and sharply, man-of-war style. In carrying messages, he should know before leaving exactly what he should say and he should deliver the message in the *exact* words received from the officer of the deck. When the officer of the deck leaves the quarter-deck, the messenger should follow him at a short distance in order to be ready if needed. Under way, the messenger's station is on the conning platform; in port, on the quarter-deck, where in addition to his regular duties he can be of great assistance in performing small jobs, for example, tending boat lines. As a rule he is charged with scrubbing the port gangways during the morning watch. The messenger should be in exact uniform at all time and pay particular attention to the neatness of his personal appearance. He must remember that he may be of very valuable assistance to the officer of the deck if he carries out his orders quickly and intelligently. Other seamen, second class, are often detailed as messengers to various heads of departments; their duties are of the same general nature as the duties of the officer of the deck's messenger. All messengers will obey the following general rules:

(1) *Be in uniform of the day from 0800 until 2100, with the addition of neckerchief if it is not a part of the uniform of the day.*

(2) *Be attentive to calls.*

(3) *Carry messages on the run and return at once to the sender and report that the message has been delivered.*

(4) *If unable to deliver the message, so report to the sender at once.*

(5) *A messenger sent to an officer's room will knock and will neither enter the room nor open the door or curtain until told to do so.*

(6) *Obtain permission from the officer of the deck, or person for whom they are messengers, before going to meals or to the head.*

(7) *Never skylark, loll, or otherwise act in an unseamanlike manner.*

GENERAL DUTIES OF A SENTRY

Men detailed as sentries in the Navy perform duty as follows (*a* to *k*, inclusive, must be memorized):

(1) (*a*) To take charge of this post and all government property in view.

(*b*) To walk my post in a military manner, keeping constantly alert, observing everything that takes place within sight or hearing

(*c*) To report every breach of orders or regulations that I am instructed to enforce.

(*d*) To quit my post only when regularly relieved.

(*e*) To receive, obey, and transmit orders from the commanding officer, executive officer, the officer of the deck, or the officer or petty officer of the guard.

(*f*) To hold conversation with no one, except in the proper discharge of my duties.

(*g*) In case of fire, give the alarm; quit post if necessary to do so.

(*h*) To allow no one to commit a nuisance in vicinity of my post.

(*i*) In any case not covered by instructions, to call the petty officer of the guard.

(*j*) To salute all officers.

(*k*) At night to exercise the greatest vigilance.

(2) When calling for any purpose, challenging, or in communication with any person take the position of *port arms.*

(3) A sentry on post will not quit his arms except on an explicit order from some officer or petty officer from whom he lawfully receives orders; under no circumstances will he yield his arms to any other person.

(4) Report at once to the petty officer of the guard every unusual or suspicious event noticed.

(5) Between 0800 and sunset, the sentries at the gangway shall salute all officers in uniform, when going or coming over the side. All sentries on the upper decks, or in view from outside, shall salute all commissioned officers passing them close aboard, in boats or otherwise.

(6) Sentries, carrying rifles, salute all commissioned officers by coming to *present;* they salute warrant officers with the rifle salute. Sentries without rifles render the hand salute to all officers.

(7) When relieved, a sentry will repeat in detail to his successor all special orders relating to his post.

(8) The various posts require certain special orders. Before relieving, a sentry must make sure that he understands the special orders of his particular post; such special orders are usually posted in the vicinity of the post. Sentries may be detailed for the following posts: the gangways, life buoys, brig, ammunition passage, forecastle, and elsewhere that their services are required.

GENERAL DUTIES OF AN ORDERLY

The following rules are given as typical instructions for the captain's orderly; instructions for other orderlies differ only in minor details.

(1) Remain at all times in the vicinity of the cabin door, unless sent away on a message by the commanding officer.

(2) Accompany the commanding officer whenever he leaves the cabin, unless otherwise directed by him.

(3) Never start on a message without a thorough understanding of what is desired. The same applies in delivering a message to the commanding officer.

(4) Allow no one to enter the cabin door without authority, except the executive officer and navigator. This order may be modified by the commanding officer.

(5) All messages from the bridge or the radio room must be delivered to the commanding officer without delay, regardless of the hour, unless he has given orders to the contrary.

(6) Carry out general orders for sentinels on post.

(7) Allow no one, except the gunner, to take the keys to the magazine from the cabin, without special authority from the commanding officer. Report to your relief how many magazine keys are out and at 2000 report to the commanding officer whether or not all the magazine keys are in their places.

(8) Turn the order book over to your relief in the presence of the petty officer of the guard.

(9) When visitors are allowed on board, do not allow them to loiter in the vicinity of the cabin. Give necessary instructions courteously but firmly.

It must be noted that these orders are merely typical ones; they may vary somewhat on different ships.

SIDE BOYS

Side boys are nonrated men who are stationed within call of the officer of the deck from 0800 to sunset, except at meal times and during general drills. Their duty is immediately to fall in at the gangway, in the number designated, when it is to be tended, as it usually is for any officers coming aboard or leaving in uniform. Seamen, second class, are as a rule detailed as side boys. The uniform is clean undress blues, with neckerchiefs.

The side may be tended with from 2 to 8 boys, by twos, depending

FIG. 35-2—Side boys.

upon the rank of the officer coming on board or leaving. One pipe of the boatswain's call means 2 side boys; two pipes, 4; three pipes, 6; and four pipes, 8.

On hearing the pipe, the side boys come to the gangway on the run and are stationed by the boatswain's mate. If there is any doubt as to whose turn it is to man the gangway do not wait for someone else to do it; be there first and avoid trouble for yourself and all the other side boys.

The side boys are stationed on either side of the gangway, to form a passageway, and are then dressed. They stand at attention, salute together at the first note of the pipe, and come down from the salute together at the last note of the pipe. Side boys do not leave their station until the boatswain's mate gives them orders to leave (see Fig. 35-2).

Side boys must be military at all times. It is especially important that they be, in all respects, clean and neat. They may leave the quarter-deck for meals, on orders from the officer of the deck, and are not to leave at any time without his permission. A side boy, by keeping his eyes open, has an excellent opportunity to learn a great deal about the organization and management of a ship, naval customs, honors, routine, and many other things that a seaman should know.

Ships with a complement of less than 125 use side boys only on special occasions.

SWEEPERS

Sweepers are detailed for certain periods by the division petty officers, under the supervision of the division officer. They are assigned definite parts of the ship and are responsible that this part of the ship is swept down properly whenever sweepers are piped. The sweepers should sweep every part of the deck, particularly all corners. Men must always make way for sweepers. The sweepings must never be swept into a scupper, but always into a dust pan and then thrown into the slop chute. The decks must always be swept leeward.

SIDE CLEANERS

Certain men from each division are detailed as side cleaners and upon their proper attention to duty depends, in great measure, the neat and trim appearance of the ship. The following instructions, in general, regulate the duties of side cleaners:

(1) When they come in from over the side at *knock off,* they must bring up all stages, pots, buckets, and lines.

(2) They must attend all drills and inspections of their divisions, unless they are specially excused by the executive officer.

(3) No private gear is to be kept in side cleaners' lockers except clothing for use over the side.

(4) While over the side, men wear working dress; uniform must be whole and at least fairly clean. No mixed uniforms will be allowed and the uniform must not be torn or mutilated. Side cleaners will not be allowed to wear jumpers with the sleeves cut out.

(5) After coming in from the side, shift into the uniform of the day immediately.

(6) No stage, line, or paint pot is to be left hanging over the side when not actually in use, even for only a few minutes.

(7) Punts must be hoisted in when they are not in use; regular side cleaners keep them clean.

(8) On entering port, the side cleaners are usually excused from work in their part of the ship one hour before anchoring in order to allow them time to shift into working clothes, get stages and other gear ready, and stand by to go over the side of the ship as soon as the anchor is let go.

(9) Men over the side should have bowlines around them, and wear life jackets. Neglect of this precaution is one of the chief sources of accidental death in the Navy. Good swimmers falling from a stage may be hurt or stunned before reaching the water; in exposed anchorages or under way waves may carry away the stage itself or wash a man off it. The worst situation is in dry dock, where many men have been killed or made lame for life.

(10) These instructions are merely typical; they are subject to any change or addition that may be made on any ship.

JACK-O'-THE-DUST

The jack-o'-the-dust is an appointee of the supply officer and assists in issuing stores and cleaning storerooms.

ANCHOR WATCH

The anchor watch is a detail of men, who stand watch in port from 2100 to *turn-to*. On large ships, the watch proper consists of about 12 to 14 seamen and a petty officer. It varies with different ships, but frequently has added an electrician's mate, a gunner's mate, a carpenter's mate, a bugler, and even representatives of other departments. The seamen stand 2-hour watches in pairs, replacing the day messengers. All

other men may sleep, but are subject to call for any immediate emergency, such as manning the lifeboat, housing awnings, hauling over hatch hoods, veering chain, etc. The watch is usually required to sleep in a compartment adjacent to the quarter-deck, commonly known as the anchor-watch compartment, and a man must not change his sleeping place once it has been selected and pointed out to the petty officer or to the man whom he is to relieve. It is a very serious offense for a member of the anchor watch to sleep off his regularly assigned billet; it causes confusion in calling the anchor watch and the watch would never be assembled in time to meet an emergency if sleeping in different parts of the ship.

Men for the anchor watch are usually detailed from the duty section of the deck divisions (specialty ratings from their respective divisions) for each day. Their names are turned in to the office responsible for the anchor watch, the executive officer's office or the first lieutenant's office, by the division's leading petty officer, with the approval of the division officers. The responsible officer then makes out the official list with the watch each man is to stand and posts it early in the afternoon.

The division petty officers usually inform the men of their respective divisions that they have been detailed and, in addition, the men concerned are frequently required to initial this list. Regardless of whether or not either of these things is done, a man is responsible for finding out when he is on the anchor watch, and each man who has the possibility should consult the list each day.

At 2000 the word is passed throughout the ship, *Lay aft the anchor watch to muster,* but the officer of the deck may have this done before or after the movies. If a man fails to be present at muster, he will probably find himself detailed to stand two watches instead of one; likewise, if he is late, he will be disciplined. Failure to hear the word is no excuse. At this muster, each man finds out who his relief is and where he swings. The coxswain, or petty officer in charge, also assigns each man his station in the lifeboat and reports to the officer of the deck that the crew has been detailed and that the lifeboat is ready for use. When all are present, have received any necessary instructions, and each man has learned who his relief is, the officer of the deck allows the watch to fall out and stand by for the call at 2100, *Lay aft the first anchor watch.* On hearing this word, or in any event at 2100 the first anchor watch lays aft and reports to the officer of the deck.

Under no circumstances shall a seaman, standing one of the assigned

watches, leave the quarter-deck at any time unless he has obtained the necessary permission from the officer of the deck; likewise, he must obtain such permission before calling his relief. Nor shall an anchor watch turn in until he and his relief have reported to the officer of the deck, and he is usually required to turn over the duty in the presence of the officer of the deck.

On destroyers and on small ships there are usually 4 men in the anchor watch. Each of these men stands a 4-hour watch, acting as messenger for the petty officer of the watch. This watch may start at 1600 or 2000, dependent upon local regulations. All the men, as on larger ships, are available for emergency, but sleep in their regularly assigned bunks.

THE WATCH AT SEA

The watch is usually stood by the sections of the various divisions; each section takes a 4-hour watch in rotation. During the night watches there is, as a rule, very little to do; consequently men not at work and not on lookout are usually permitted to lie down on deck in a group, where they can easily be found. It is a very serious offense for one of the section on watch to go below for any purpose, without permission from the petty officer in charge of the section. Permission for men of the section on watch to lie down on the main deck is not always granted, and, if for any reason difficulty is experienced in getting men up promptly, they are kept on their feet. Never forget that, on a night watch, you are just as much on duty as you are during any other watch and that you are simply permitted to lie down and sleep when there is nothing for your section of the watch to do. When you are permitted to lie down on the main deck, while your section is on watch, and when you are on deck at any other time, remember the regulations to *keep off the engine-room, fireroom, and dynamo room hatches.*

The lifeboat crew, messengers, annunciator watch, wheel watch, etc., are assigned from the section on watch.

Crews of large ships are divided into 4 sections; destroyers and others, into 3 sections. The wheel watches on destroyers are usually stood by gunner's mates and torpedo-men, because the steering is sometimes difficult and also because there are hardly enough seamen, not strikers, to man all stations.

CHAPTER 36

DECK SEAMANSHIP

Sea terms 424
Preparing for port 427
Getting under way 428
Rigging gangways and booms 429
Heaving a line 430
Mooring a ship with lines 432
Mooring to a buoy 434
Fenders 435
Boat lines and their uses 436
Coiling down rope 437
Forward hold 439
Tarring down 439
Awnings 439

SEA TERMS

SEA TERMS are being partially covered in each assignment. Some of the general terms are given here.

Barnacle.—A shell-fish often found on a vessel's bottom.

Battens.—Strips of wood, such as those secured over the tarpaulins of a hatch to batten down in bad weather; also strips of wood fastened to spars to take chafe of gears (chafing battens); also strips of wood on which a sight may be lined up.

Beacon.—A post or buoy placed over a shoal or bank to warn vessels of danger. Also a signal mark on land.

Bearing.—The direction of an object from the person looking.

Bends.—The strongest parts of a vessel's side, to which the beams, knees, and futtocks are bolted. The part between the water's edge and the bulwarks.

Berth.—An anchorage; a station; a sleeping billet.

Betwixt wind and water.—That portion of the vessel along the water line which, when the vessel rolls, is alternately above and below water.

Bitter end.—The end of a rope.

Boarding.—The act of going on board a vessel, either for the purpose of getting information or extending courtesies.

Boat cloak.—A cloak used by officers.

Booby hatch.—A raised small hatch.

Bos'n's chair.—The piece of board on which a man working aloft is swung.

Brackish.—Half salt and half fresh water.

By the head.—A term applied to a vessel when she is deeper forward than aft.

By the stern.—Applied to vessel when she is deeper aft than forward.

Cast.—To pay a vessel's head off and bring the wind on the desired side, as to cast to port. Hence, to head in a certain direction in bringing up the anchor. To take a sounding or cast the lead. The throw with a heaving line.

Chockablock.—Full; filled to the extreme limit.

Coaster.—A vessel engaged only in running up and down the coast.

Cockbill.—A yard is cockbilled when one yardarm is cocked up above the other; an anchor, when hanging by ring stopper up and down.

Conning.—Directing the helmsman in steering a vessel.

Dead reckoning.—A reckoning kept so as to give the theoretical position of a ship without the aid of objects on land, sights, etc. It consists of plotting on a chart (map) the distance believed to have been covered along each course which has been steered. On a long voyage the navigator runs it from noon to noon.

Dead water.—The eddy under a vessel's counter when she is in motion.

Dog vane.—A small wind vane placed on the truck or above the rail.

Dismantle.—To unrig a vessel and discharge all stores.

Dolphin.—A piling or a nest of piles off a wharf or beach, or off the entrance to a dock for mooring purposes.

Ebb.—The outflow of the tide.

Eddy.—A circular motion in the water caused by the meeting of opposite currents.

Forging ahead.—Going ahead slowly.

Fend off.—To shove off.

Freeboard.—That portion of a vessel out of water.

Full due.—To secure permanently; secure for a full due.

Field day.—Day for cleaning up of all parts of a ship.

Freshen the nip.—To set up again; to veer on the cable or pull upon a backstay to shift the chafe from a particular spot.

Holystone.—A sandstone, used in holystoning decks.

Hull down.—Said of a vessel when, due to its distance, only the spars are visible.

Irish pennants.—Rope yarns or loose ends hanging about the rigging or deck. Their appearance is very unseamanlike.

Labor.—To roll or pitch heavily.

Landfall.—Sighting land. A good landfall is made when a vessel sights the land as intended.

Latitude.—Distance north or south of the equator, expressed in degrees, minutes, and seconds.

Lend a hand.—To assist; to aid.

Let go by the run.—To let go all at once, as by throwing a rope off a pin.

Lighter.—A craft used in loading and unloading vessels.

Longitude.—Distance east or west of the meridian which runs through Greenwich, England. Expressed in degrees, minutes, and seconds.

Lower booms.—Swinging spars along the ship's side to which ship's boats secure. Usually placed a little forward of amidships.

Oakum.—Stuff made by picking rope yarns to pieces. Used for calking and other purposes.

Off and on.—Coming alternately near the land and then standing off again.

Overhaul.—To take apart, thoroughly examine, and repair; to overtake.

Pipe down.—A boatswain's call denoting the completion of an all-hands evolution, and that you can go below. This expression is also used to mean "Keep quiet."

Quarter booms.—Boat booms aft.

Rake.—The incline which most masts have toward the stern of the ship. Also, an instrument for estimating fall of shot.

Ride.—To be held by the cable, as a vessel riding to her anchor.

Round in.—To haul in, as round in the main brace.

Run down.—One vessel fouling or sinking another by running into her.

Screw.—The propeller.

Scotchman.—A piece of iron with ring attached, seized to the shrouds.

Sheer off.—To shove off; to separate by altering course.

Spur shores.—Long timbers used to keep a ship off a dock. The heel of the spar is lashed to the ship's side and the other end rests on the dock.

Strike the colors.—To lower the flag in surrender.

Swamp.—To sink by filling with water.

Scuttle.—To make holes in a ship's bottom to sink her. A round or square opening in the deck.

Ship.—To take on board. To enlist; to serve on board ship.

Snub.—To check a rope or chain suddenly.

Spring tides.—The highest and lowest course of tides, occurring every new and full moon.

Surge.—A large, swelling wave. To surge a rope or cable is to slack it up suddenly where it renders around a pin or around the windlass or capstan. This gives an irregular jerky movement.

Swing.—A ship turns or swings to her anchor with the wind or tide.

Swing ship.—To head the ship successively on various points of the compass for obtaining the error of the compass. The error may be obtained on one heading without swinging.

Transoms.—Pieces of timber going across the sternpost, to which they are bolted. Raised platforms in small vessels and yachts, officers' quarters, etc., and used for seats.

Truck.—A cap at the summit of a flagstaff or masthead.

Turnbuckle.—A link with an adjustable screw for connecting two parts of a bar or a rod together; used on Jacob's ladders, ridge ropes, guys, etc. It allows them to be tautened after they are rigged.

Typhoon.—A violent whirlwind. Those which are encountered in the Far East are usually the only ones so called.

Unship.—To take anything from the place where it is installed for use.

Up-take.—The enclosed trunk connecting a boiler or a group of boilers to the smokestack.

Veer and haul.—To veer on one part of a line and haul on the other, both being connected to the same spar or movable article; also the shifting of the wind.

Water-logged.—When a vessel is so full of water as to be heavy and unmanageable.

Weather gage.—To windward of; to get the better of.

Wind ship.—To turn her end for end; at a dock, for instance (pronounced wind).

Windfall.—A rush of wind from the high land; a stroke of good luck.

PREPARING FOR PORT

In addition to cleaning up about the decks and shining bright work, as necessary, the deck divisions must:

(1) Rig gangways and booms.

(2) Remove gripes from boats to be used and prepare the boats for lowering immediately.

(3) Remove canvas covers.

(4) Tauten all lines.

(5) Square up boat davits.

(6) Lower wash clothes.

(7) Test anchor windlass and get anchors ready for letting go.

(8) Send leadsmen to the chains.

(9) Have special anchoring detail man stations.

If the ship is to moor alongside a dock or another ship, they must, in addition:

(1) Provide heaving lines.

(2) Provide fenders.

(3) Fake down lines.

(4) Have chafing gear and rat guards ready as necessary.

(5) Rig in boats and davits as necessary. Destroyers deck the inboard anchor.

Nothing indicates a smart ship better than the seamanlike manner in which the ship comes to anchor. When the anchor goes down, the colors should be run up on the flagstaff, the jack hoisted, all booms rigged out smartly, and both gangways lowered. All these things should be done together. The boats should be ready for lowering immediately. The ship should be neat and trim and all men in the uniform of the day. All this can only be accomplished by each man knowing his particular job and doing it snappily.

GETTING UNDER WAY

Prior to getting under way, the same preparations must be made as for anchoring, except, of course, the procedure is reversed in some cases. The gangways and booms may or may not be taken in before the anchor is actually aweigh, depending upon the orders of the officer of the deck and custom on that particular ship. In addition, the sea detail must be stationed, all communication instruments, machinery, and the main engines tested, and any mooring lines singled up, on orders of the officer of the deck. All boats may be hoisted prior to getting under way, or some may be picked up after leaving the anchorage, depending on circumstances. Shipshapeness, smart shifting of colors, and rigging in of anchorage apparatus is just as important in getting under way as they are when the ship comes to anchor.

RIGGING GANGWAYS AND BOOMS

Before starting to rig, the proper tools and parts should be provided. For the accommodation ladder, commonly called gangway, there should be jiggers, straps, hammer, wrench, davit, upper and lower platforms, bail, stanchions, handrails, necessary bolts and cotter pins, fender, boat line and the main body of the gangway. A man should be standing by with a life jacket on and a bowline around him. The upper grating is usually secured upright in the gangway opening, on large ships, as this opening must be closed at sea, and it is therefore only necessary to drop it and bolt the brace to the fitting provided on the side. The davit is usually in place. A strap is passed around the gangway and it is maneuvered to the proper position and over the side by means of the davit and a jigger hooked through the strap. It is then bolted to the fittings on the after, under side of the upper grating.

While the gangway is being held by the davit and straps, the lower grating is bolted on and the bail secured. The davit is then shifted to the bail, the permanent fender secured, the stanchions placed in their sockets, and the rails set on and secured. The large puddin' fender, if used, must be hoisted over the side with a jigger, lowered, and squared up: the boat line led out and its weight rigged. Care must be taken not to drop any bolts because the rigging may be held up until they can be replaced. Each stanchion must be placed in its proper socket, and each rail in its proper place; otherwise, they may not fit. Any man going over the side while under way, which is necessary in securing the brace and other parts, must wear a life jacket and bowline.

Booms are usually stowed completely rigged and a long oar is about all that must be provided. All rigging, however, should be cleared and led out. Booms are usually secured along the rail, with the outboard end aft and resting in a circular fitting. The outboard end is attached to the topping lift, the steadying guys led to the end, and guest warps are secured along the boom. To haul out the boom, the forward and after guys should be manned and the after end elevated and given a slight start before the anchor is actually let go. Upon anchoring, the end of the boom should be started on the run by shoving it smartly with an oar while the forward guy is also being hauled. The after guy is used to check too violent a swing. When the boom is out, the guys are tautened, the guest warps cleared, and the topping lift elevated or lowered, as necessary to retain the boom level. A boom must never be left without first being squared up.

HEAVING A LINE

A heaving line is a light line used to get a hawser ashore when mooring a ship to the dock or in passing a heavy line for any purpose whatever. One end of the heaving line is fitted with a fairly heavy knot to assist in getting distance when heaving, but loaded lines are nonregulation. The other end of the heaving line is bent to the hawser with a clove hitch. The rest of the heaving line is carefully coiled; about two-thirds of the coil being held loosely in the left hand and the rest in the right or heaving hand.

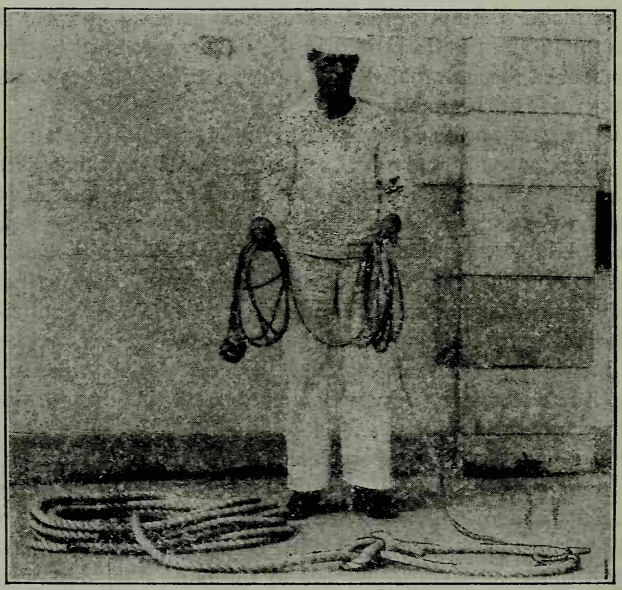


FIG. 36-1—Heaving a line, ready position.

In heaving, the right (casting) arm should be held straight and the line in the left hand allowed to run out freely. The most frequent trouble in getting a long heave is due to the coil in the left hand not being arranged clear for running. Frequent practice is necessary to become proficient and everyone should practice making casts at every opportunity. A poor cast is always a reflection on the ability of the seaman. The illustrations show the correct method of heaving a line.

FIG. 36-2—Heaving a line, start of heave.

FIG. 36-3—Heaving a line, finish of heave.

When mooring lines are to be used, a heaving line should be available for each line, and spares also provided, if practicable. The heaving lines should be coiled, ready for use, and the ends bent to the hawser, outboard of the life lines, and passed over the top life line so that they

will not foul when heaved. These preparations and expert heaving are absolutely necessary because it is all-important to get your line to the dock, or other ship, as soon as possible. On getting under way, heaving lines should be available for any emergency use.

MOORING A SHIP WITH LINES

A ship is moored when it is made fast to a mooring buoy, when it is swinging on the bight of a chain between two anchors in line, or when it is secured alongside a dock, or another ship, by lines. The lines used in mooring a ship alongside a dock are shown in Fig. 36-4.

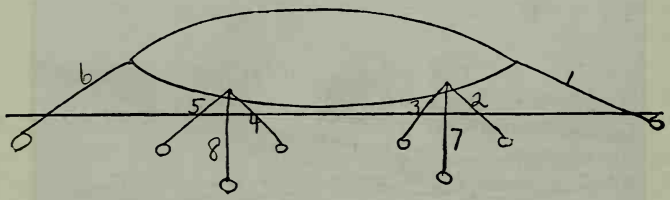


FIG. 36-4—Mooring lines.

1, Bow line; 2, forward bow spring; 3, after bow spring; 4, forward quarter spring; 5, after quarter spring; 6, stern line; 7, forward (bow) breast; 8, after (quarter) breast.

The bow and stern lines are usually longer than the others and run directly from the bow and stern, respectively. They have less angle than springs, if space permits them to be led out well forward and aft. In addition, there might be a set of lines between the bow and quarter ones, and these would be known as the forward waist spring, waist breast, and after waist spring. Any combination of these lines may be used in mooring, or there may be more than one of each. Thus, there may be two forward bow springs, two waist breasts, etc. As can be seen, a breast leads at right angles to the ship, and a spring at a sharper angle, either forward or aft. Well prior to mooring, the lines should be faked down, fore and aft if practicable, each near the chock through which it is to pass. The end which has the loop should be passed through the chock, the heaving line bent, and the loop laid back on the life line.

The bow line and forward springs prevent the ship from drifting astern. With sternway on, both these lines, when secured, tend to breast the ship in.

The stern line and after springs prevent the ship from drifting for-

ward. With headway on, both these lines, when secured, tend to breast the ship in.

The forward and after breast lines prevent the ship from drifting away from the dock.

When mooring lines are used for handling the ship in coming alongside, it is very important that they be got out as soon as possible and that the orders of the officer conning be promptly and accurately obeyed. In these orders the lines are referred to by numbers, the forward line being No. 1, and you may be told to hold, check, or keep slack in any of them, as *Hold one, Keep slack in two, Check three.*

When a line is checked, it is payed out a little at a time as the strain on it becomes heavy. A line should be checked rather than parted, even without orders, but you should watch your line carefully; foresee the fact that the strain is about to become dangerous and inform the person in charge. Warning of a dangerous strain is given by observation, by the creaking of the hawser, or by standing on it to feel the strain. If it is inevitable that a line will part, stand clear because the end will whip and might cause serious injury to you.

Lines are singled, *i.e.*, there is only one part leading to the dock, while mooring, but they are doubled up in securing, with one or more bights being looped over each cleat or bollard (an upright post on a dock), so that there will be several parts to each line. When doubling up, the lines should be rove around so that each part is of equal length, otherwise one part of the hawser will carry the entire strain. Two different lines may be used if the original is not long enough for doubling. In mooring to a dock, slack must be left to allow for the rise and fall of the tide, and all lines should be watched for maximum strain at high or low water, and slacked or tautened as necessary.

All lines, where they are subject to wear, as where they go through the chocks on the ship or where they rest on the dock, should be protected by chafing gear. This is usually old canvas strips wrapped around the lines and secured with lashings.

Rat guards are always put on the mooring lines of an inboard ship, except when it is moored to a United States Navy ship at a buoy, to prevent the rats from coming aboard over them. They consist of a circular metal disk, made in halves, which can be lashed together on the lines. They usually dip toward the center and the concave side should face outboard.

Some large ships have *mooring* staples permanently built on their

sides. They are large, oblong metal eyes to which chains can be attached in securing to a dock. Battleships usually have 3 on each side.

So far as practicable, lines should be kept clear of the water at all times.

Never attempt to check a line which is running out rapidly by stepping on it. If you do, you will probably find yourself with a broken leg or over the side.

MOORING TO A BUOY

Large ships infrequently moor to a buoy, but it is a part of a destroyer's regular routine. The systems for both types of ships are essentially the same, and the one for destroyers will be discussed here.

Mooring buoys are usually equipped with a ring on top, and mooring to one consists, essentially, in leading an anchor chain through it and back on deck. Accomplishing this, however, is not so simple. Preparations must be made, the ship must be brought up and held over the buoy, and the chain rove through the ring, sometimes laboriously. The bow is brought over the buoy, if possible, under the ship's own power and is held in this position by a line large enough to secure the ship temporarily. One end of this line is usually shackled to a ring on the buoy, and the other retained on board and secured after the shackling. This line may be connected, if conditions are ideal and the whole operation performed expertly, by a man lowered from the deck. However, it is usually led out by a boat preceding the ship, due to the difficulty involved in placing the bow right over the buoy and keeping it there for any length of time.

In preparation, a seaman wearing a life jacket should be lowered in the boat, and he should have with him a large open shackle, with the pin secured to it with a light lanyard, and a wrench. The chain should be unbent, led through a forward chock, and a dipping line attached to the end link; chain stoppers should be cleared, and heaving lines, small fenders, and convenient tools provided.

When near enough to the buoy to avoid causing the boat to tow an excessive length of line, the securing line is given to the boat where it should be held by a turn around a fixed object, and the shackle then bent on its end.

The boat lands the man on the buoy, where he completes the shackling as quickly as possible. The coxswain of the boat must be careful not to foul his propeller in the line or to damage his boat against a rolling buoy, and he should clear the buoy after landing the line, but remain

near to help if necessary. The boat should take the man off the buoy when the shackling is completed because the buoy may roll heavily if struck by the ship or if caught in the wash.

When the line is secured to the buoy, the slack may be taken in on deck and held. This securing line, led to the capstan, may also be used to bring the bow up to the buoy, but this will careen the buoy. Care must be taken to avoid parting the line.

As soon as the ship is in position, the buoy man returns, receives the dipping line from deck, passes it through the ring, and returns the end to deck, preferably by means of a heaving line dropped to him. This line may then be taken to the capstan and it and the chain drawn through the ring and back on deck, where the bitter end of the chain is secured by stoppers, after a sufficient bight has been run out to prevent the ship's riding the buoy. It may be necessary for the buoy man to assist during this operation by rendering the chain throught the ring, but it is usually better for him to leave the buoy and return, if this becomes necessary, in order to avoid the possibility of his being thrown from the buoy or caught between the buoy and the ship.

The chain having been stopped on deck, the securing line may be disconnected.

Mooring to a buoy requires a thorough knowledge on the part of all hands, and seamen frequently have several important stations. All apparatus must be immediately ready because the operation must be accomplished as quickly as possible, otherwise the bow may fall away from the buoy and ships which are waiting to come alongside may be held up. A miscue on the part of anyone may delay the procedure long enough to require a new approach, and might cause serious damage to the boat or even cost the life of the man on the buoy.

There are some variations to this type of mooring; for instance, the chain might be shackled directly to the buoy, a heavy wire might be used in place of the chain, etc. The type of buoy, length of stay, and size of the ship vary the conditions.

FENDERS

While the laying out of fenders prior to going alongside should be routine, their readiness for use has been found to be all-important. Therefore, the seaman responsible for breaking out the fenders should be sure that enough of them are placed at convenient points along the deck. They must also be handled intelligently. When it is apparent that the ship is about to touch, the men detailed, or any one unoccupied,

should put a smaller fender over the side at the point nearest to striking. It does no good if the fender is just dropped into any open space. It may be necessary to allow it to roll as the ship moves on it or to shift it forward or aft to cover a new danger point. Frequently, a great deal of good may be done by placing a fender so that it will come up against another held on the other ship or on the dock. You are too late if you do not place your fender before the space is too small to allow its entry. No cut-and-dried rules can be given; handling fenders simply requires good "horse sense" and does not allow "sleeping on the job."

Destroyers suspend a large fender from the gallery deckhouse prior to going alongside, the ship going alongside being required to furnish the fender on the side with which he aproaches. This fender must be eased over so as not to part its securing line and should be suspended just above the water line. It may be held either vertically, by a line at one end, or horizontally, by a line at each end.

Wooden spars, or floats, may be secured to a dock to act as fenders between the ship and the piling. These are called *camels*.

BOAT LINES AND THEIR USES

A boat line is a line leading from the deck, well forward, to the gangway. A light line made fast to the gangway is attached near the end of the boat line for hauling it in, or the boat line may be run through a block under the upper grating, so that it may always be reached by the bowman of a boat at the gangway. The second type is usually equipped with a counter-balanced weight, which returns it to its normal position when the end is released. When not in use, the free end of the boat line is neatly Flemished down on the gangway.

The boat line is passed to boats whenever a strong tide is running, or when heavy winds or heavy seas make it impossible for the bowman to hold on with his boat hook. It should always be tended by a side boy or messenger whenever a boat comes along.

Figure 36-5 shows how a boat line is used to hold a boat alongside

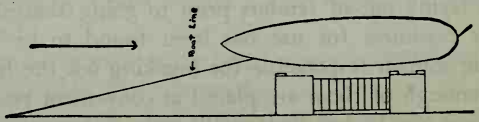


FIG. 36-5—Use of boat line.

the gangway in a strong tideway. It is led around a cleat on the inboard bow of the boat and secured. The rudder is put over outboard as shown in Fig. 36-5. By a judicious use of the rudder, the boat can be held in the position shown. The bowman and sternman should assist if necessary in keeping the boat off with their boat hooks but far the greatest aids in keeping the boat off are the boat line and rudder.

COILING DOWN ROPE

The ends of running rigging, not in use nor led out for use, should never be left in any but one of the coiled conditions, *i.e.*, coiled, Flemished, or faked down. This makes them neat and seamanlike, prevents fouling, and prepares them for immediate use. The method to be employed depends upon conditions at the time and the future use of the particular line. If it must be ready for emergency use, it is coiled down, clear for running, as in the case of the falls of a lifeboat which is ready for lowering; if the entire length must run out fairly rapidly, a line is faked down. If it is not expected that the line will be needed on short notice, it is Flemished down for greater neatness. The ends of boat falls, boom guys, boat lines, guest warps, etc., are usually Flemished down from 0800 to sunset on a ship at anchor. At night and at all times at sea

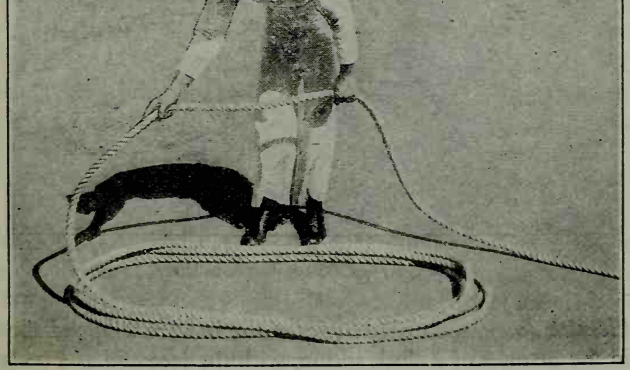


FIG. 36-6—Coiling down a line.

those which may be used are coiled down. All lines should be hung on hooks or laid on the life lines while the decks are being washed down, to avoid wetting them needlessly.

Right-handed rope should always be coiled in a clockwise direction, with the lay; left-handed, counter-clockwise. This is done to prevent unlaying of the line.

Before starting to coil a line by any method, it should be led out if possible, all kinks removed, and all turns taken out. All kinks and turns must be taken out while coiling if it was not possible to lead out the line first.

To make a *straight coil,* a circular bight of the secured end of the line is laid on deck and successive bights are placed on top of this until all the line has been used, care having been taken to keep out kinks and turns. The whole coil is then capsized to leave it clear for running.

To *fake down,* a short length of the free end is laid out in a straight line and then turned back to form a flat coil. Successive flat coils are then formed, laying the end of each coil on top of the preceding coil.

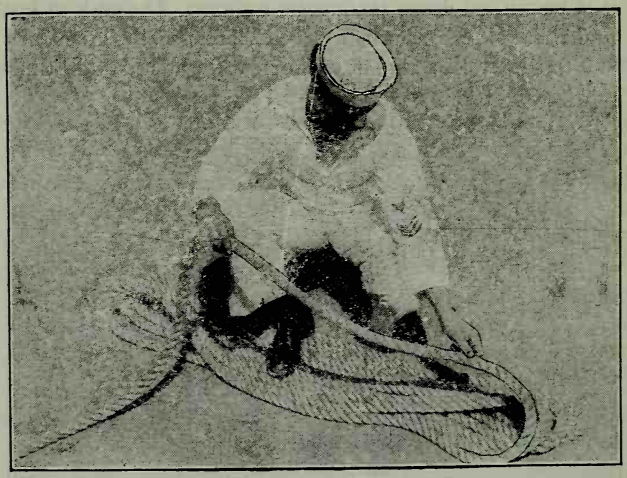


FIG. 36-7—Faking down a line.

To *Flemish down,* successive circles of the line are wrapped about each other in the manner of a clock spring, with the free end as a center. The circles should then be wound taut against each other until the completed coil resembles a mat. Frequently fancy Flemishes are made, for exam-

ple, with a regular Flemish coil in the center and the rest of the line placed in various shapes about it but always so as to retain the appearance of a mat.

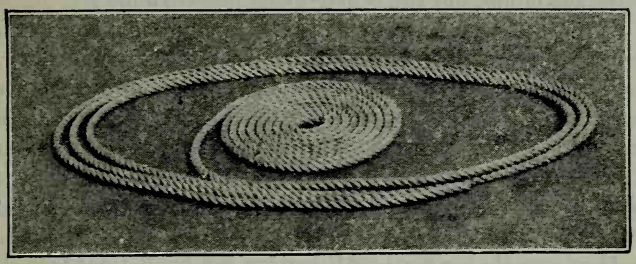


FIG. 36-8—Partially Flemished line.

FORWARD HOLD

The lines, blocks, tackles, straps, cleaning gear, and other articles used about the decks are stowed in the forward hold and each seaman should learn what can be found there and how to get it.

TARRING DOWN

Standing rigging, if of hemp, is protected from the weather by a coating of tar oil and coal tar. This must be renewed at regular intervals. Wire rigging is protected by being galvanized and then wormed, parceled, served, and coated with tar oil and coal tar. Rigging must be tarred down when it dries out and turns a brownish color.

The man doing the tarring rides up and down the rigging in a boatswain's chair. He should inspect carefully to see that the line used is not weak at any point.

Tar is applied with a rag. It must be handled with great care to avoid getting spots on the deck, awnings, or paint work.

AWNINGS

Spreading.—Awnings are canvas coverings spread over the decks of a vessel to protect the crew from the weather. Awning stanchions, secured around the rail of the ship, support the ridgerope to which the awning is hauled out by means of the earing and stops. The middle of the awning is held up by a strong jackstay leading fore and aft and supported by intermediate stanchions. There may be a wooden strongback along the ridge and others leading from it to the rail.

When the order is received to *Spread awnings,* the awnings are broken out from the hold and placed in their proper places on deck. Everything should be done by order and together. The division petty officer directs the operation and the orders given are as follows:

(1) *Loose awnings.*—Stops are cast off. Awning is spread out in two folds on deck preparatory to hauling one side over the jackstay.

(2) *Haul over jackstay.*—One side of awning is hauled over the jackstay. It now lays suspended from the backbone and is made fast forward and aft, after having been tautened out by use of a fore-and-aft tackle. It is very important that the awning be well tautened out at this time in order to have it spread properly without wrinkles. The earings are rove off and manned.

(3) *Haul out the earings.*—All earings are hauled out taut and the ends wrapped evenly and tautened around the standing parts. If large spaces occur between earings a stop midway between earings should also be hauled out. The earings must be hauled taut to get a good spread of the awnings.

(4) *Lay up and bring to the stops.*—All men of the division lay up on the rail and bring to the stops, equalizing their intervals on both sides of the awning. All ends of both earings and stops must be neatly tucked so as to present a seamanlike appearance.

(5) *Lay in.*—Men on the rail lay in together.

(6) *Pipe down.*—Men are dismissed.

Earings are fairly large securing lines and stops are the smaller ones between.

Housing awnings consists in securing points along the edge to a lower place than normal.

Awnings are housed during wet weather so as to allow them to shed water better, or are housed to help prevent them being blown loose by a wind. This is also done in order and together. At the command *House awnings,* the men of the divisions concerned go immediately to their stations under their awning. The other orders are as follows:

(1) *Lay out.*—Men lay out on the rail, equalizing their distances on both sides of the awning.

(2) *Cast off the stops.*—Two or more stops between each earing are cast off.

(3) *Bring to the stops.*—The cast-off stops are brought to tautly on the upper life line and the ends neatly tucked.

(4) *Lay in. Pipe down.*—Men lay in and are dismissed.

Furling.—Awnings are often furled on the backbone or jackstay temporarily to prevent them from being carried away by heavy winds. This is done in order and together. At the command *Furl awnings,* all men repair to their stations under their awning. The other orders follow:

(1) *Lay out.*—Men lay out to the stops and earings.

(2) *Cast off the stops.*

(3) *Cast off the earings.*—After the earings and stops are cast off one side is hauled over and placed together with the other half of the awning.

(4) *Furl awning.*—Men distribute themselves along the awning and make a taut furl up to the backbone, where the awning is stopped to hold it in place.

In case the awning is to be furled and stowed away, the same procedure as above is followed, except that the awning is taken off the jackstay. It is important that the awning be absolutely dry before it is stowed below, as it will otherwise be soon destroyed by mildew.

CHAPTER 37

GROUND TACKLE

Definition 442
Types of anchors 442
Anchors carried on ships 446
Anchors—General 446
Anchor cables 447
Shackles 448
Swivels 450
Cable markings 450
Billboard stowage of anchors 452
Foul anchors 453
Care of ground tackle 453
Mooring with anchors 454

DEFINITION

GROUND tackle is a name given to the articles of equipment, considered collectively, used in connection with anchoring. It includes all anchors; any cable for use with anchors, whether made of chain, wire rope, or a combination of the two; and all appendages for use with the cable. The appendages are connecting shackles, bending shackles, mooring shackles, gear and tools used on shackles, clear-hawse pendants, dip ropes, mooring swivels, chain hooks, chain stoppers, wrenches for chain stoppers, and bending shots for submarine submerged anchors, and Eagle-boat anchors.

TYPES OF ANCHORS

Four types of anchors are issued to ships of the United States Navy: Navy type, which has stocks and are commonly called old-fashioned anchors; patent anchors, without stocks; short-shank stockless anchors; and mushroom anchors.

The old-fashioned anchor was the type in general use throughout the world until about 1875, when it began to be replaced by stockless patent anchors. It is still used in the United States Navy on old destroyers, some of the smaller ships, and for boat anchors.

The corresponding parts of all types of anchors carry the same names, and because the Navy type has all the parts that other anchors have, with some additional, its nomenclature is given. These parts are:

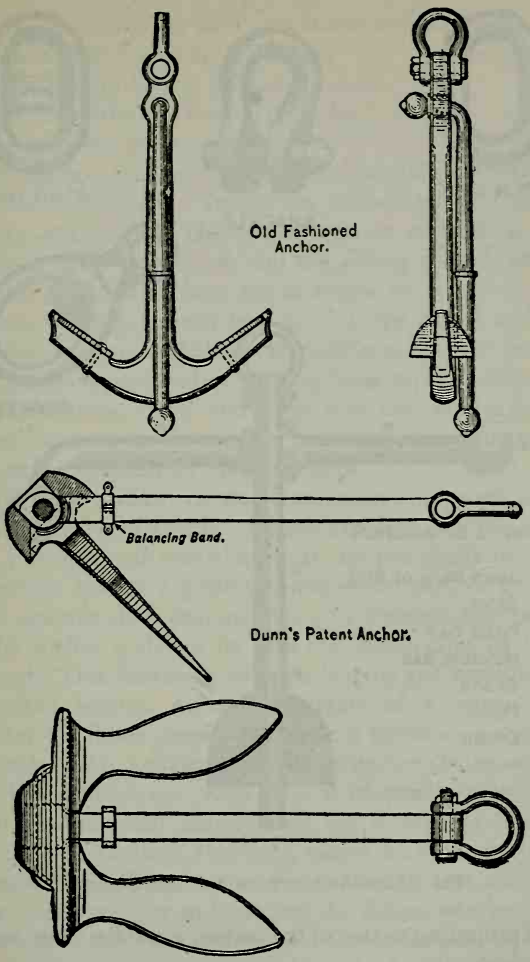


FIG. 37-1—Types of anchors.

Ring (Shackle or *jew's-harp).*—The ring to which the cable is bent. It is at what is considered the top of the anchor and is attached to the shank by a riveted pin.

Stock.—The cross arm just below the ring.

Shank.—A bar, vertical when the anchor is suspended by the jew's-harp. The stock runs through the shank in a direction at right angles

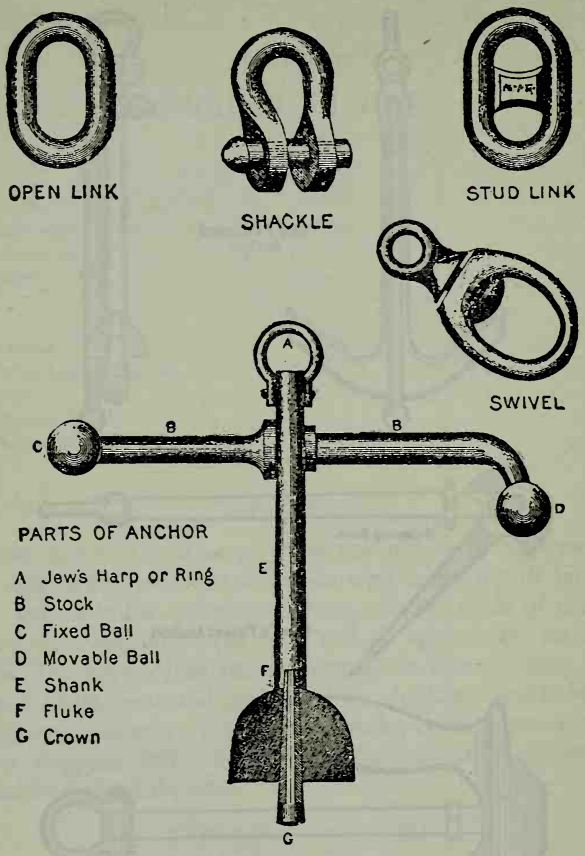


FIG. 37-2—Anchor parts and attachments.

to the lower projecting section of the anchor, it and the lower section being built in one piece.

Crown.—The rounded part of the anchor at the lower end, directly below the shank. On patent anchors the crown has projecting shoulders of different shapes and these turn on the bottom and force the anchor to take hold.

Arms.—The pieces extending to each side of the crown.

Throat.—The upper curved part of an arm, where it joins the shank.

Palm or *fluke.*—On an old-fashioned anchor a broad, shield-shaped

piece attached to the top of each arm at the end. On a patent anchor the corresponding flat, hook part is a fluke.

Blade.—The part of the arm beneath the fluke.

Bill.—The part of the arm beyond the fluke.

Pea.—The tip of the palm, or fluke.

The old-fashioned anchors are stowed horizontally on platforms near the bow, called *billboards*. To get an anchor on the billboard requires *catting* and *fishing*. The *catting* consists of getting the anchor to the hoisting davit, or cathead, and the *fishing* consists of placing it on the billboard. Patent anchors are in almost universal use, except on old destroyers. As may be seen in Fig. 37-1, the patent anchor lacks a stock, its flukes are long and almost at right angles to the arms, and the crowns are more apparent than on the Navy-type anchors. The unit consisting of the arms, crown, and flukes is pivoted on the shank so that it can swing from 40 to 45 degrees on either side. This construction causes both palms to take hold when one does.

Patent anchors.—There are numerous makes of patent anchors, but the United States Navy chiefly uses the *Norfolk Navy Yard* and the *Baldt*. The principle and operation of all are practically the same.

Patent anchors possess a great advantage over the Navy type in convenience of stowage. It is only necessary to continue hoisting until the shank of the anchor is drawn up into the hawse pipe, its flukes lying against the side. This does away with the lengthy and sometimes dangerous catting and fishing. Added advantages of a patent anchor are that neither of the flukes project and there is therefore no possibility of a ship's bottom being punctured by its own anchor while swinging over the anchor in shallow water. Also there is no possibility of their interfering with gunfire when secured, and the absence of a stock makes them less liable to fouling. However, patent anchors require a longer scope of chain than the Navy type, due to the fact that an upward pull on the ring has a tendency to break out the flukes, whereas on the old-fashioned anchors this pull drives the fluke in deeper. Also, a patent anchor has less holding power than a Navy type of the same weight.

Special anchors.—*Short shank, stockless anchors* are no more than ordinary patent anchors with a shank which is shorter than normal. They are used on a few ships whose build does not permit a long hawse pipe.

Mushroom anchors are metal weights, shaped like a mushroom and built with a shank. The rounded part is down; *i.e.*, it strikes the bottom first and the upper part is slightly cupped so as to give a biting edge.

The shank projects from the center of the cupped side. This type of anchor is issued to O-, R-, and S-class submarines in addition to a stockless anchor.

ANCHORS CARRIED ON SHIPS

A ship may carry bower, sheet, stream, stern, kedge, and boat anchors. These names are derived from the position or use of the anchor and apply regardless of the type. They are defined as follows:

Bower anchor.—The anchors carried in the bow and used for all anchoring, except in unusual circumstances.

Sheet anchor.—A reserve anchor which was formerly carried by large ships. It was the same weight as the bower anchors and was carried on deck, or more usually housed in a hawse pipe just abaft the bower anchor.

Stream anchor.—An anchor of medium weight for miscellaneous use. It is called a stream anchor because an anchor of this type was carried at the stern on men-of-war in the past. This was at a time when ships were frequently required to anchor in rivers and other confined waters, and it was often necessary to secure the ship with anchors both bow and stern to prevent swinging.

Stern anchor.—Any anchor which is carried at the stern, regardless of weight or purpose.

Kedges.—Small anchors, usually of the Navy type, the heaviest of which does not weigh more than a ton. They are intended for kedging, *i.e.,* moving a ship ahead a small distance at a time, by taking one of the anchors out in a boat, letting it go, and then hauling the ship up to it. If this is done to change the heading of the ship, as by hauling the stern around, it is called *warping.*

Boat anchors.—Small Navy-type anchors for use in boats.

ANCHORS—GENERAL

Anchors are usually made of cast steel; the fittings and the shanks of housing anchors, of forged steel.

Anchors vary in weight from wherry anchors, weighing 30 pounds to those carried by the *Saratoga* and *Lexington,* weighing about 30,000 pounds. Anchors have their weight stamped on them near the base and a Bureau of Ships serial number and the date of manufacture.

Edges of anchors are chamfered, or otherwise smoothed, to prevent damage to the ship's hull when hoisting.

ANCHOR CABLES

Anchor cables are usually made up of 15-fathom lengths, called *shots,* which are connected by shackles. Standard cables vary in length from 105 fathoms for destroyers to 180 fathoms for the larger ships. The chain is of the cast-steel, or die-lock, type, except where old issue wrought iron or forged mild steel is still in use.

The first shot, the one made fast to the anchor, is usually a 5-fathom shot, and the succeeding ones are 15-fathom shots. The 5-fathom shot contains a swivel and is limited in length to prevent the swivel riding the wildcat when the anchor is housed and to permit unshackling for the Eldridge method of mooring. Each shot has a serial number stamped on the end link.

The links of a chain may be either open or stud (Fig. 37-2). The stud link gets its name from the cross piece at its center. Links are further subdivided into common links, enlarged links, long end links, short end links, and end links, these names describing the shape and assembly of the link. Common links, which are standard, have the stud at the center; enlarged links are spread more than common links; end links have straight sides and are usually longer than the rest of the links, and the long end link has a stud near one end. A few of the old destroyers use 1-inch open-link chain, with the link shorter than standard, this shorter link being called close-link; other ships usually have stud-link chains.

The links of wrought iron and forged-steel cable are made from straight bars, which are first heated and then bent back to form the shape of a link. The partially made link is then again heated and the ends are scarfed and threaded through a completed link. The partially completed link becomes a part of the chain when the scarfed ends are welded together.

Cast-steel links are made by pouring molten steel of the proper grade into molds. Half the links required for a shot are completed and laid out, a space being left between adjacent links which is about equal to what the space between them will be when they have been joined to form a chain. Interlocking molds built for this purpose are placed between each pair of completed links and the casting material is poured in. When the molds are removed, a shot of chain remains, the studs having been cast as an integral part of each link. This finished shot of chain is "tumbled" to remove scale, projections, etc. Cast-steel chain is about 60 per cent stronger than the other types.

Die-lock chain is manufactured from rolled alloy steel. The strength

of this steel is 100,000 lb. per square inch in the rolled condition. If suitably heat treated, it may be made to have a strength of 150,000 lb. per square inch and yet retain sufficient toughness for use in chain. The member of the link which is forged with tapered end portions, with a series of ribs and collars is called the male member. The other member which is referred to as the female member is made by bending a piece of rolled stock into U-shape and forging hollows in its ends to receive the tapered end portions of the other member. In completing a link, the tapered end portions of the male member are inserted into the hollow ends of the other member, the latter having just been heated to a forging temperature. The first member being cold and the second being hot the compression of the dies flows the plastic metal of the female section into close engagement with the ribs and collars of the inserted cold member. The lock is mechanical, there being no fusion of the metal of the two sections.

The size of the chain is designated by the diameter of the iron from which the common links are made. In the United States Navy the standard sizes range from ½ inch to 3½ inches, the variance between two successive sizes being 1/16 inch. Standard links are 6 times as long as their diameter, except that some of these still in use comply with the old standard and are 5.7 times as long.

SHACKLES

Shots of a cable are joined by some form of connecting shackles. They may be *U-shaped shackles, Kenter connecting shackles,* or *detachable links.*

The U-shaped shackle was the old standard. It is a piece of steel forged to a U-shape and with a hole in each of the flattened ends. To connect two shots, the shackle is first passed through an enlarged end link on the shot nearest the anchor, *i.e.,* bow part outboard. The U-opening is next closed through the end link of the other shot by passing a bolt through the flattened ends of the shackles. This bolt is secured with a forelock pin which is driven through a small hole in the enlarged end of the shackle and into a similar hole in the bolt itself. The forelock pin is jammed by upsetting a lead keying ring in a groove, built in the pin to receive it. The U-shaped shackle is practically obsolete.

Forged-steel Kenter shackles (Fig. 37-3) are now standard. The T-neck and T-slots of each of the two parts are fitted together through the links which are to be joined, and are locked in place by the stud

and a tapered locking pin. The stud has shoulders which hook over projections on each half of the shackle and hold the two together. The tapered locking pin is then passed diagonally through both halves of the shackle and through the stud, thus combining the whole as a unit.

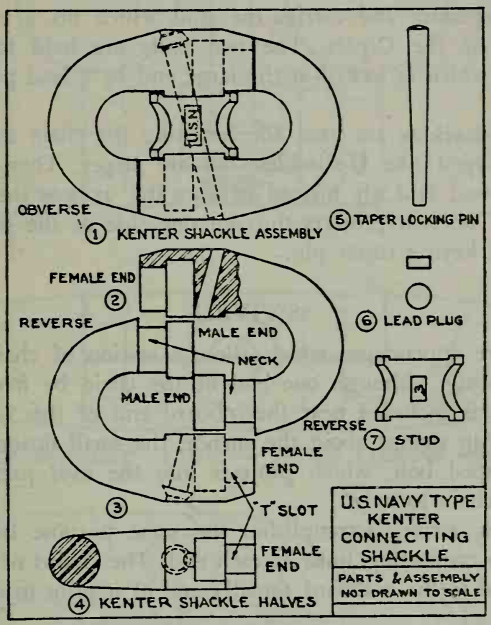


FIG. 37-3—Kenter shackle.

The Kenter shackle must be assembled so that the small end of the pin is pointing toward the anchor when the anchor is down, and the keying ring or lead plug, if the method is used, must be well upset to insure that the lead flows into place. A Kenter shackle can be made so that it is of approximately the same size and shape as any other link of a stud-link chain. This permits the chain to ride more smoothly over the wildcat, eliminates the need for the enlarged end links, and, since there are no projections, does away with loss of anchors caused by the opening of U-shackles, which spread from fouling deck fittings or projections in the hawse pipe.

The principle of detachable links is the same as that of Kenter shackles and they have replaced the Kenter shackles in some cases. A detachable link has a **C**-shaped part, comprising about three-fourths of the link. Projecting into the **C**-opening, from each side of the part, are pieces which look like the upper end of a circular-headed bolt. The second part of a detachable link slots over these projections, fills the **C**-opening and carries the stud which fits a pocket in the closed side of the **C**-part. The two parts are held together by a tapered pin which is locked at the large end by a lead plug (see Fig. 37-4).

Bending shackles are used for fastening the chain to the anchor. They are shaped like **U**-shackles, but are larger. They are bent on with the bowed end aft instead of forward, as was the case of the **U**-shackles. The bolt projects through one side of the shackle and is secured by a keying cotter pin.

SWIVELS

Swivels are appendages which allow a section of chain to revolve without twisting, although one end of the chain be fixed. A swivel (Fig. 37-2) is included near the inboard end of the 5-fathom shot. When the ship swings about the anchor, the small fitting revolves on the rivet-shaped bolt, which projects into the oval part, instead of causing the chain to twist.

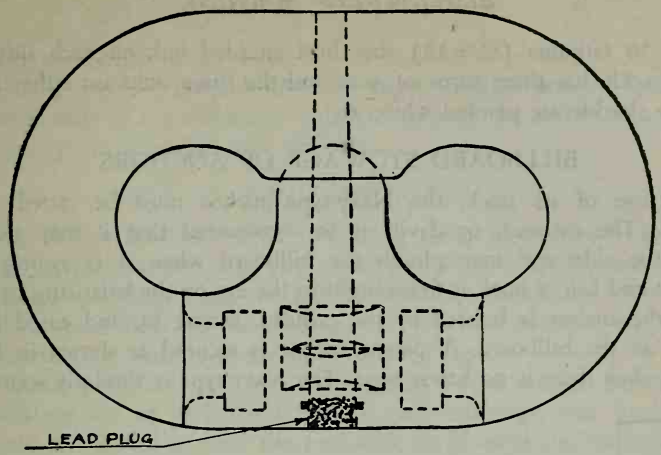
A mooring swivel accomplishes the same purpose but is heavier and has two connecting links at each end. The chains of two anchors are connected to the outboard (small) end of it prior to mooring with anchors.

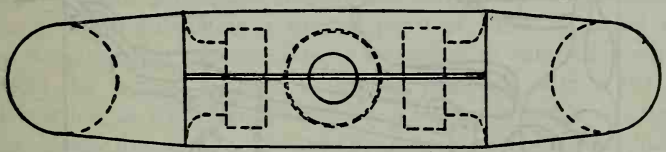
CABLE MARKINGS

To aid in judging the amount of anchor chain which has run out, distinctive markings are usually placed on a cable at intervals of 15 fathoms. Although the type of markings may vary slightly on different ships, the following is the system commonly used:

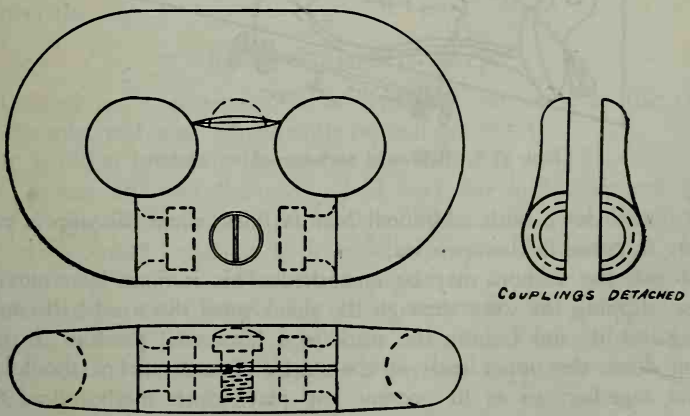
At 20 fathoms (the 5-fathom bending shot and the first 15-fathom shot of chain puts a shackle at 20 fathoms) the first studded link on each side of the shackle has a turn of wire around its stud and is painted white.

At 35 fathoms (20+15) the second studded link on each side of the shackle has two turns of wire around its stud and the two links on either side of the shackle are painted white.





DETACHABLE LINK — TAPER LOCKING PIN TYPE



DETACHABLE LINK - FILISTER HEAD SCREW TYPE

FIG. 37-4—Detachable link.

At 50 fathoms (35+15) the third studded link on each side of the shackle has three turns of wire and the three links on either side of the shackle are painted white, etc.

BILLBOARD STOWAGE OF ANCHORS

Because of its stock, the Navy-type anchor must be catted and fished. The cathead, or davit, is so constructed that it may swing over the side and may plumb the billboard when it is swung in. To cat and fish, a hook is first caught in the eye on the balancing band; then the anchor is hoisted by the cathead, swung in, and eased into place on the billboard. A patent anchor is secured as shown in Fig. 37-5, when there is no hawse pipe. The Navy type is similarly secured.

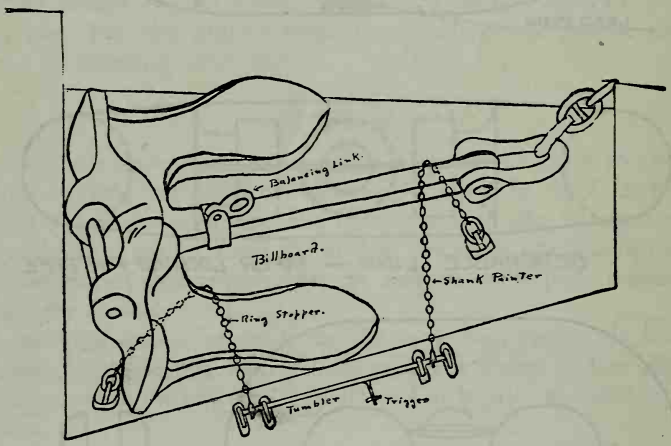


FIG. 37-5—Billboard stowage of an anchor.

It is lashed down with additional Manila lines, when the ship is preparing to cruise in the open sea.

At sea, the anchors may be unstocked. This is done by removing a key, slipping the stock through the shank until the fixed ball comes up against it, and lashing the stock in a horizontal position. If this is not done, the upper ends of the stocks of each anchor should be bound together, so as to prevent any play which might allow the lower ends of the stocks to beat against the bow plating. The cathead must also be lashed in place when securing for sea.

When a destroyer is going alongside another ship or a dock, the in-

board anchor should be decked. This is done by picking it up off the billboard with the cathead, and reseating it on a bar, placed across the inboard side of the billboard. This bar supports the anchor, but allows no part of it to project over the side.

FOUL ANCHORS

An anchor may be fouled by having turns of the chain wrapped about its parts as the ship swings over it. Originally this was almost a normal condition, but the installation of a swivel has done away with a great deal of the fouling, and stockless anchors are not as susceptible to fouling as the old-fashioned type.

No set rules can be given for clearing a foul anchor, because the conditions are so variable. It can be said, however, that the anchor should be hoisted as near the forecastle as possible and must be well secured without dependence on the chain. After analyzing the situation, the chain should be slacked and looped about the anchor to clear it, as if untangling a snarled piece of cord. A patent anchor must be suspended over the side by a pendant of sufficient strength to support the anchor. Usually, a seaman, equipped with a life jacket and bowline, is sent over the side in a boatswain's chair to rend the chain about the anchor, as may be necessary. Great care must be exercised by all, because the heavy anchor, chain, and parts offer great potential danger; any slip might seriously injure the man who is over the side.

CARE OF GROUND TACKLE

Ground tackle is expensive, is extremely important to the safety of the ship, and must consequently be well preserved.

In addition to testing links when the anchor is weighed, cable must be "roused up" and "ranged" (laid out) for inspection and overhaul at regular intervals. This must be done at least once each quarter to the entire length of each cable which has been used. A chain, which has been used, must be inspected to the 60-fathom shackle at least once each month. On these occasions the chain must be cleaned, usually by wire brushing, inspected thoroughly, shackles and forelock pins overhauled as necessary, and paint renewed where it has been worn.

At least once a year each chain must have a similar complete overhaul and, in addition, all shackles and shackle pins must be refitted and greased or white leaded and identification marks restored.

At this time the little-used inboard shots are shifted to an outboard position to distribute evenly the wear throughout the chain. Any doubtful shot is placed at the bitter end (the end inside the chain storage compartment) until it can be repiaced. Defective shackles and studs may be renewed, but a bad link condemns its whole shot. The convenience of a dry dock is usually taken advantage of for this work. The chain lockers (the chain storage compartment) should be cleaned and painted while the chain is out. Any slipshod work in connection with chain overhaul may result in the loss of an anchor, grounding of your ship, or personal injury to yourself or your shipmates attendant to the loss of control of an anchor.

MOORING WITH ANCHORS

A vessel moors when she lets go two anchors at a considerable distance apart and equalizes the scope of chain on each so that her bow is held approximately midway on a line between them.

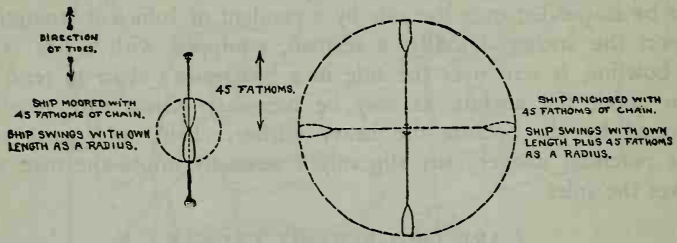


FIG. 37-6—Object of mooring ship.

Mooring does not increase the hold of the ship to the ground for the reason that she rides to one of the anchors, when lying along the line between the two, or otherwise "rides to the span."

When a ship is riding to a span, the two chains act like a bridle and the tension on the cable is greatly out of proportion to the power used for holding the ship. A moor is therefore only used in restricted waters, its advantage coming from the fact that the ship swings about her own stem and in a circle whose radius is only slightly longer than the length of the ship.

Flying moors are the ones most generally used and are most advantageously made when the ship is mooring in a direction opposite to that of the current. In executing a moor of this kind, the first

anchor is dropped while the ship is moving slowly ahead. While she is being gradually brought to a stop by the use of the engines and by snubbing the chain, slightly less than twice the amount of chain to be used on the anchor is allowed to run out.

The chain should not be snubbed until after most of it is out.

The second anchor is now dropped and its chain is veered as the ship drifts with the current, the chain of the first anchor which was dropped being hove in at the same time. This is continued until the ship is approximately halfway between the two anchors. Details of the moor are then completed. If it has been necessary to moor with the current, the turn of the tide is frequently awaited before veering, because backing with the engines will cause the ship to swing off the line between the anchors.

In the United States Navy a moor includes the use of a swivel, and this must have each anchor chain connected to its outboard end and a riding chain secured to the inner end. On large ships, where there is room for the two chains and the swivel to run out through one hawse pipe, this is usually done on deck, the swivel being first inserted in the riding chain.

A clear-hawse pendant, two preventers, a dip rope, easing-away line, deck stoppers, tackles, unshackling kits, straps, lashings, etc., are required for this evolution.

Mooring gear.—A seamanlike moor requires prompt and intelligent action on the part of all concerned.

A *clear-hawse pendant* consists of about 30 fathoms of wire rope, a 6-fathom length of open-link chain about half as large as the ship's cable, and a pelican hook. The pelican hook is attached to one end of the chain and the wire is tailed on to the other by splicing it onto a shackle, fitted with a round bolt and a solid thimble. The pelican hook usually has a light tripping line attached to it, so that it may be opened without sending a man over the side. The clear-hawse pendant is used to retain and support the cable whose end is to be transferred to the other side of the forecastle.

Preventers are hawsers which are bent to the anchor chain, either above or below the point where the clear-hawse pendant is secured. They may be heavy Manila or wire. They prevent loss of the chain in case the clear-hawse pendant's pelican hook is tripped or its hold is otherwise accidentally released.

The *dip rope* consists of 6 fathoms of 3-inch wire (open link chain is sometimes used), shackle large enough to engage a link of the

cable, and a 30-fathom length of 7-inch Manila. The shackle is bent to one end of the wire and the Manila to the other. This line is led out through the hawse pipe of the riding chain into the other hawse pipe, and is connected near the end of cable to be dipped. It is used to haul this cable across the bow and into the hawse pipe of the riding anchor. The wire is to take care of chafing in the hawse pipe.

An *easing-out* line is usually of heavy Manila. It is attached to the end of the cable which is to be dipped, and is used to ease out this chain while it is being hauled in on the other side by the dip rope.

Foul hawse.—When a ship is moored, the hawse may be fouled if the ship fails to swing first to one side and then to the other. The inclusion of a mooring swivel has practically eliminated fouling, but it can occur. The conditions of fouling are defined as follows:

(1) *Cross in hawse.*—The chains cross each other once, the starboard anchor being on the port bow and the port anchor on the starboard bow.

(2) *Elbow in hawse.*—After putting a cross in hawse, if the ship again swings through a half circle in the same direction, she puts an elbow in the hawse.

(3) *Round turn.*—Still another half circle swing in the same direction puts a round turn in the chain.

(4) *Round turn and elbow.*—The fourth half circle in the same direction adds an elbow to the round turn.

A round turn, or anything more complicated, can only be cleared by the use of the clear-hawse gear, which includes the clear-hawse pendant, preventer, dip rope, and easing-out line. In clearing, the lee chain is properly secured by means of the clear-hawse pendant and preventer, is unshackled, and the turns taken out, dipping it around the weather chain. It is reshackled after being cleared.

CHAPTER 38

STEERING AND SOUNDING

The rudder 457
Types of steering gear 457
Steering orders 459
Instructions for good steering 461
Compasses 462
Logs 468
Sounding 469

THE RUDDER

EACH SHIP or boat, regardless of size, is supplied a rudder which is located amidships aft. By it the ship may be steered. When the rudder is moved off the center line, it blocks the even flow of the water and thus causes the stern of the ship to be pushed toward the opposite side, *i.e.,* if the rudder is put right, the stern of the ship will be shoved to the left and the bow consequently to the right. The greater the flow of water the greater the rudder resistance. Therefore, at high speed more power is required to move the rudder and greater steering effect is available. Large rudders are balanced, having a smaller part which projects to the left when the rudder is put to the right and vice versa. This piece assists in moving the rudder, because the action of the water on it is such as partially to counteract the pressure on the main part. Rudders are usually constructed so that they may swing through an angle of 70°, *i.e.,* 35° on each side of the center line. Metal lugs are fitted to the rudder post on the ship and to the rudder itself to prevent any further travel. These are called *positive stops;* they are provided to stop the swing of the rudder in case of casualty to the steering gear, but the rudder should not be intentionally brought against them.

TYPES OF STEERING GEAR

In order to use the turning effect of the rudder, power must be provided for moving it, and there must be some provision for transmitting this power to the rudder. Also, there must be some effective means of controlling the power from steering stations located in different parts of the ship. The apparatus provided for the movement of the rudder is called the *steering gear.*

Small boats and ships of all sizes are steered by a rudder located in the stern of the vessel and the rudders extend in general from just below the water line to the keel line of the vessel. The area of rudder varies according to the size and speed of the vessel. Attached to the rudder is the rudder stock which shaft extends up above the water line to a point where, by means of a tiller, quadrant, or rudder crosshead, the rudder can be moved through an angle of about 36° either side of the fore-and-aft center line of the vessel.

When the rudder is put over, say, to the right (looking forward) of the center line, the bow of the vessel moves to the right and when the rudder is moved to the left the bow moves to the left. The pressure of the water on the rudder area causes the stern to swing away from the side on which the rudder has been moved to and thus the vessel's heading is thereby change to the *right* when the rudder is *right* and to the *left* when the rudder is *left.*

In small boats hand power is sufficient to move the rudder by means of a tiller or quadrant attached to the rudder stock. Where the tiller only is used, the coxswain is located aft in the boat, whereas when a quadrant is used, the coxswain is located elsewhere in the boat and uses a small steering wheel connected to the quadrant by cable, rope, rods, or chain or a combination of these items to move the rudder.

As vessels increase in size, it soon becomes impossible for a man properly to handle the rudder directly, due to the force required to move and hold the rudder in the desired positions. The result is that some form of power is required.

Power steering gears on naval vessels are in general classed as follows and these units are located in the vicinity of the rudder:

(*a*) Steam steering gears.
(*b*) Straight electric gears.
(*c*) Electro hydraulic gears.

The above gears are further divided into two different kinds, based on the *control* used, namely:

(*a*) *Follow-up* type of control.
(*b*) *Non-follow-up* type of control.

A *Follow-up* type of control is one so arranged that the steering wheel can be turned to the desired rudder angle and the steering engine will cause the rudder to come to the steering-wheel-pointer indicated position and stop.

A *Non-follow-up* type of control is one so arranged that the steering

gear will cause the rudder to continue moving until the distant controller is brought to the *off* position.

The *Control* design of all the latest destroyers, cruisers, submarines, gunboats, and battleships is of the *follow-up* type, whereas certain of the older vessels have the *non-follow-up* type of control.

All main power steering gears can be operated from certain distant steering stations as well as locally. The usual distant steering stations are bridge or pilot house, conning tower, central station, and secondary conning station. The following methods of distant control of steering gears are provided depending on the main type of main steering gear unit installed:

(*a*) Electric controller.
(*b*) Hydraulic telemotor.
(*c*) Selsyn or synchroties.
(*d*) Wire cables, chains, rods, or a combination thereof.

In addition to the main power steering gears, there is usually provided an auxiliary or stand-by method of steering the vessel. These consist of one or more of the following units:

(a) Hand power consisting of blocks and falls attached directly to the rudder crosshead or quadrant or a number of large handwheels geared thereto.

(b) Electric motors driven from main generator, storage batteries, or auxiliary Diesel generator sets.

(c) Air motors driven from the ship's air service line.

(d) Hydro-electric steering gear stand-by unit.

(e) Auxiliary steam steering gear unit.

STEERING ORDERS

The first part of a command used in giving orders to a steersman designates the direction of movement, *i.e., right* or *left*. This enables the man at the wheel to start putting on rudder before the second part of the command, stating the amount to be used, is given.

Standard orders are as follows:

Right (left) full rudder.
Right (left) standard rudder.
Right (left) standard half rudder.

Full rudder is usually used to designate 30° rudder; the available 35° rudder is usually used only in emergencies, and care should be taken then not to throw the rudder against the stops with sufficient

force to jam it. Standard rudder and standard half rudder vary on different ships. Such a number of degrees are designated for each as will cause all ships of a unit to turn in the same space if they are using similar rudder. A seaman should know the prescribed rudder for his ship before relieving the wheel.

Right (left), 5 (10, etc.) degrees rudder.—This indicates the angle in degrees which the rudder is to be offset.

Right (left), handsomely.—"Handsomely" is defined as "carefully." It is used, in orders to the rudder, when only a very slight change of course is desired.

Give her more rudder.—Increase the rudder angle already on. This order is sometimes given when it is desired to turn the ship more rapidly, in the direction she is already turning.

Ease the rudder.—Decrease the rudder angle which is on. This order may be given, *Ease to 15 (10, 5, etc.).*

Rudder amidships.—Place the rudder on the center line.

Meet her.—Check, but do not stop, the swing. This is done by putting the rudder in the opposite direction. This order is usually used when it is desired to keep the ship from swinging past her new course.

Steady, Steady so, Steady as you go.—Steer the course you are on. If the ship is swinging, the course should be noted at the time the order is given and the ship steadied on that course.

Shift the rudder.—Change from right to left rudder. This order is usually given when a ship loses her headway and commences to gather sternboard, if it is desired to keep her turning in the same direction.

Mind your rudder.—Steer more carefully or stand by for an order to the wheel.

Mind your right (left) rudder.—Use more right (left) rudder from time to time. This order is used when the ship shows a marked tendency to get off her course more to one side than to the other.

Nothing to the right (left).—Do not steer anything to the right (left) of the ordered course. This is given when the course to be made good is a shade to one side of that set.

Keep her so.—Steer the course which you have just reported; given, following a request for the course.

Very well.—The situation is understood; used in reply to a report made by the steersman.

Sometimes, especially on small ships, the steersman may be told to follow the ship ahead, to steer for the lighthouse, etc.

In order that the officer of the deck may know that his orders have

been correctly received, steersmen must always repeat, word for word, any command received. In addition, as soon as the command has been executed, he reports the fact to the officer of the deck, as *Rudder is right full, sir; Steady on course 257, sir;* etc.

INSTRUCTIONS FOR GOOD STEERING

The ability to steer can only be attained by practice, but some cautions may be given.

In first learning to steer, it must be remembered that the compass does not move; it is the lubber's line (a black line on the rim of a compass which represents the ship's center line or head) which follows the ship's bow. The wheel or the controller is so arranged that the bow will turn in the direction toward which the wheel or controller is moved. Consequently, to steer a given course, it is only necessary to move the lubber's line toward that course, and this may be done by turning the wheel toward that course, *i.e.,* considering the wheel as amidships. For instance, if the given course is 270° and the lubber's line is actually on 268°, it must be moved to the right; this may be done by moving the wheel toward the right. New steersmen frequently make large, unintentional turns in attempting to make the course follow the lubber's line.

Rudder must be taken off before the new course has been reached. When a ship has once started to swing, it will continue after the rudder has been taken off; this is due to momentum combined with the delay between the movement of the wheel and the action of the rudder.

If the rudder is left on too long, the ship will swing past the course, and the probable result will be a continuous yawing from one side to the other. This makes steering difficult for the ship astern, slows down your own speed, and puts unnecessary strain on the steering engine. When a battleship is making an appreciable change of course, it is usually necessary to put the rudder amidships at 20° from the new course and to meet her when she is 10° from it. On smaller ships it will be necessary to leave the rudder on longer. No set rules can be given for taking off the rudder, because the proper time depends on the particular ship, the speed, the amount of swing, the force and direction of the wind, etc.

Under ordinary conditions, it *should not be necessary to use large amounts of rudder,* or even to make frequent changes, once the ship has settled on her course. However, frequent small changes are preferable to the use of large amounts of rudder because of the difficulty

of getting steadied on the course, once the ship has started swinging. To steer properly, the steersman must be "on the job." He must not wait until the ship is several degrees off the course before applying rudder, but must watch the compass and check the swing with a small amount of rudder as soon as it is apparent that the ship is moving off her course. Also, the wheel should be turned slowly, or the controller used in the first notch, to avoid racing the steering engine. The compass, and not the ship ahead, must be observed at all times, unless orders to the contrary have been received. The higher the speed the smaller the amount of rudder required to swing the ship.

A ship will frequently carry right, or left, rudder. That is to say, the rudder may act as if it were amidships when the indicator is several degrees to the right, or left, of the zero mark. This may be due to wind, sea, error in the indicator, slack in the wheel ropes, unequal speeds of the engines, etc. Regardless of the cause, the rudder should be handled as if the offset amidships were the true amidships. Information regarding any rudder that is being carried should be obtained before relieving and should be passed on. It must be remembered, however, that this condition may change.

A ship frequently runs into weather which causes her to yaw or swing off her course suddenly. Some of the bad effects of this may be offset by "meeting her" as soon as she starts to swing.

It may be said that the first requirement of steering is to stay on the assigned course. In order to be classed as a good steersman, however, you should be able to do this, under ordinary conditions, without using large amounts of rudder. Also, you should be able to stay comparatively steady on your course, and should be farsighted enough to avoid the necessity of moving the rudder rapidly. Good steering gets the ship to its destination more quickly, by making mileage in the desired direction, and by cutting down the retardation caused by use of the rudder. Also, it enhances the reputation of the ship, increases the engineering score, lessens the possibility of a steering casualty, and is important to the *safety* of the ship. Every seaman should, therefore, make the best of every opportunity to learn to steer, and, when on a wheel watch, should give all his attention to steering, no matter how much experience he has had.

COMPASSES

Magnetic compass.—The United States Navy standard compass (see Figs. 38-1 and 38-2) is a 7½-inch liquid compass. Its main parts

are a bowl, 4 bundles of magnets, and a skeleton card 7½ inches in diameter, made of brass.

The bowl is of cast bronze and is ballasted with lead to decrease its motion when the ship is rolling. It has a glass cover secured against a rubber gasket so that it will be air-tight. When the compass is mounted, the bowl is filled, through a filling hole in the side, with a mixture of alcohol and distilled water, which will not freeze. This mixture helps support the card and prevents it from swinging too fast. A self-adjusting expansion chamber made of elastic metal is installed in the lower

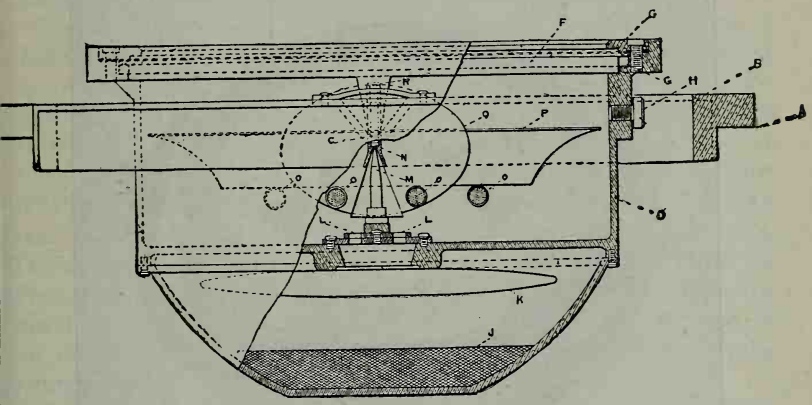


FIG. 38-1—Cross section of a standard compass.

part of the bowl. This chamber allows the liquid to expand without breaking the glass, and is necessary because the bowl must be constantly full and have no air bubbles. The expansion chamber usually has a glass bottom and a mica top, so that the card can be illuminated from underneath. There is a bearing pin projecting upward from the bottom center of the bowl. The lubber's line is marked on the forward side of the bowl, and the bowl is so installed that this line will be exactly in the center line of the ship.

The compass card is installed in the bowl so that a sapphire bearing in the lower center rests on the bearing pin. However, it only rests lightly on this pin, because the card is equipped with an air chamber which causes the liquid to support most of its weight. The bundles of magnets are sealed in cylinders on the bottom of the card. These magnets, if undisturbed by local influence, will cause north on the card

to point to the north magnetic pole, which is offset from the true north pole.

The compass card has 360 divisions, each representing 1°; these are counted clockwise from 0° at north around to 360°, also north. Numbers are placed beneath the markers at intervals of 10°. The cardinal and intercardinal points are also drawn on the card. The cardinal points are north (0°), east (90°), south (180°), and west (270°). The intercardinal points are midway between the cardinal points and are

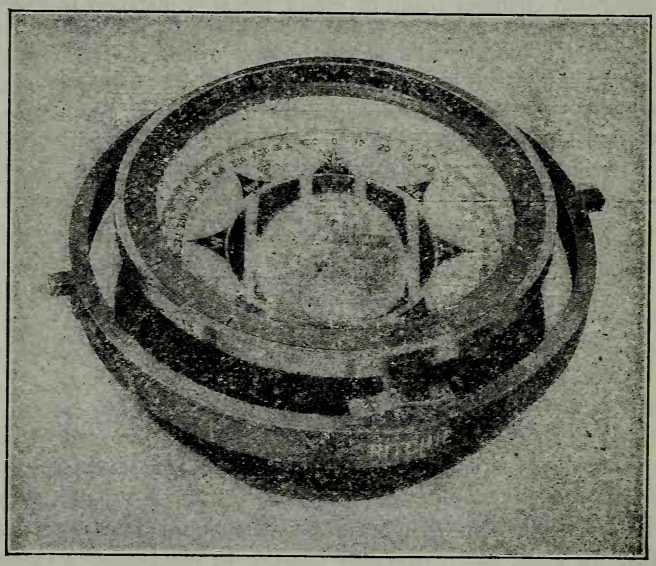


FIG. 38-2—Navy standard 7½-inch compass.

NE. (45°), SE. (135°), SW. (225°), and NW. (315°). In the illustration of a Navy standard compass it will be noted that the lubber's line is at 343°.

There are actually 32 points of the compass, each consisting of 11¼°, but the remaining 24 are not shown on modern compasses; they have been left off because their use has been practically discontinued. As a matter of interest, an example of the order in which they run is given as follows: N., N. by E., NNE., NE. by N., NE., NE. by E., ENE., E. by N., E., etc. To *completely* box a compass (name all the points in order) each point is divided into fourths. In this operation

points and quarter points are named from north and south toward both east and west, except that quarter points are always named away from cardinal and intercardinal points.

The following is an example of complete boxing: N. ¼ E., N. ¼ W., N. by E. ¼ E., NNE. ¼ E., but the quarter point following NE. by N. is NE. ¾ N.; from south they run S. ¼ E., S. ¼ W., etc. This is unimportant to a modern seaman.

Compass error.—It has been stated that the north point of a magnetic compass will point to the north *magnetic* pole if undisturbed by local influence. However, *true* north is the point from which courses are reckoned, and there are always local influences. The result of this is that the course steered by magnetic compass differs from the true course by an amount known as the compass error. The compass error is the algebraic sum of *variation* and *deviation*. Variation is that part of the error caused by the offset of the north magnetic pole from the true north pole and by magnetic qualities of the earth in a particular locality. It is practically permanent in each locality, changing only a little each year. It is shown on the chart, and the error is the same for all headings. Deviation is that part of the compass error caused by the magnetic influence of the metal of the ship. It is varied by changes within the metal of the ship and is different for each course. A tabulation of the deviation on different headings is made from the data obtained by swinging ship.

Compass error accounts for the difference between the gyro course and the course by standard compass. The gyro is frequently checked against the standard compass to see that this difference remains the same, and the steersman should immediately report any change in the difference. The magnetic compass is less liable to unexpected large errors than the gyro, and any marked change in the two courses, as given, probably indicates that the gyro is off. The magnetic compass may nevertheless be given an unaccountable error by bringing metal into its vicinity; the steersman, therefore, should not carry any metal, as a knife.

Binnacle.—The magnetic compass is housed in a stand, called a *binnacle*. The compass rests in this on two gimbal rings which allow it free motion in all directions; thus it remains in practically a horizontal position regardless of the roll and pitch of the ship. In the United States Navy a compensating binnacle is used. A "compensating" binnacle (see Fig. 38-3) is so constructed that a large part of the magnetic influence of the ship's iron may be counteracted. This is called *compensating the*

compass, and is accomplished by properly setting the soft iron spheres, on each side of the binnacle, and sets of magnets in the lower part. The binnacle is made of brass (which is a nonmagnetic metal) and has an illuminated cover; this cover is, as a rule, left off in the daytime, but is put on at night to prevent any glare. A magnifying glass with spider legs is usually set on the glass cover of the magnetic compass to assist in reading the numerals.

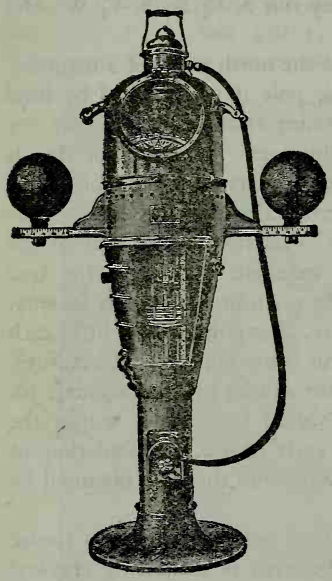
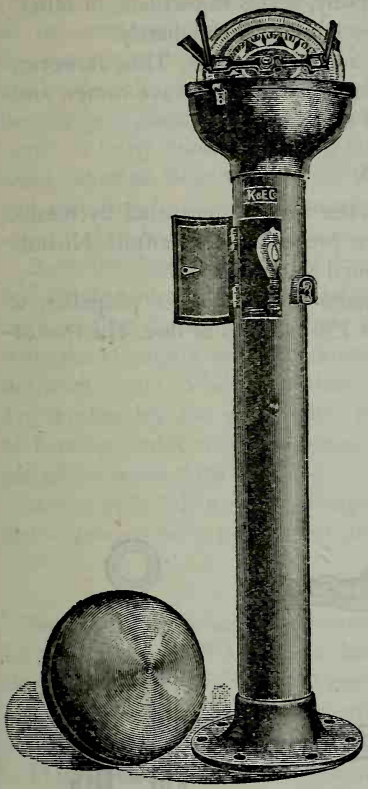


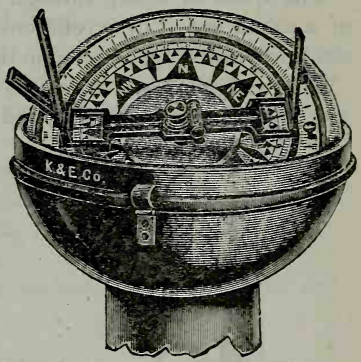
FIG. 38-3—Compensating binnacle.

A pelorus stand (see Fig. 38-4), similar to a binnacle, is usually located on each wing of the bridge. Peloruses are non-compensating and contain either a piece of glass, marked like a compass card, or a gyro repeater. They are used for taking bearings; for this the pelorus, "dumb compass," employs an installed sighting vane, and the repeater a bearing circle placed over it. These bearings are usually true, when taken by gyro, and are converted to true when taken by a dumb compass; they are used for locating the position of the ship, the true direction of an object, etc. To convert a dumb compass bearing, it is necessary to know the course of the ship when the bearing is taken. The person taking the bearing secures this by saying, *mark,* as he takes the bearing, and having the steersman carefully read the course, on the "mark."

Gyrocompass.—Most ships, including destroyers, are now navigated and steered by the helmsman using the gyrocompass to keep the vessel on the desired course. The principle of the gyrocompass is such that it is adjusted to point to true north and, therefore, has no error when it is operating properly. However, if a small error is left in the gyro it is the same for all courses. Numerous repeaters, which are kept in step with the master gyrocompass, are placed about the ship; a repeater is actually what is steered by. In addition to indicating the true course, the gyro has another advantage in that it does not oscillate with the roll of the ship. However, the repeaters do oscillate slightly all of the time as they follow the master and they make a clicking sound. If this oscilla-



THE ILLUMINATED DIAL PELORUS.



THE ILLUMINATED DIAL PELORUS CHAMBER AND BOWL.

FIG. 38-4—Pelorus.

tion ceases for an appreciable length of time, the gyro may be "out," and the fact should be reported. It must be remembered that the magnetic compass is still the standard compass and that the gyrocompass, being mechanical, may get out of order and unexpectedly ease off the true course. If the repeater oscillates too rapidly, ceases to oscillate, or otherwise acts peculiarly, the fact should be reported immediately.

Radio compass.—Most ships have a radio compass. This, however, is used to determine the direction from which a radio wave comes, and has nothing to do with the steering of the ship.

LOGS

The speed of a ship through the water may be measured by means of a patent log or by revolutions of the propeller. The taffrail, Nicholson, and Forbes logs are used in the United States Navy.

The taffrail log consists of a rotator, resembling a propeller, a speedometer-like mechanism, and about 150 fathoms of line. The rotator

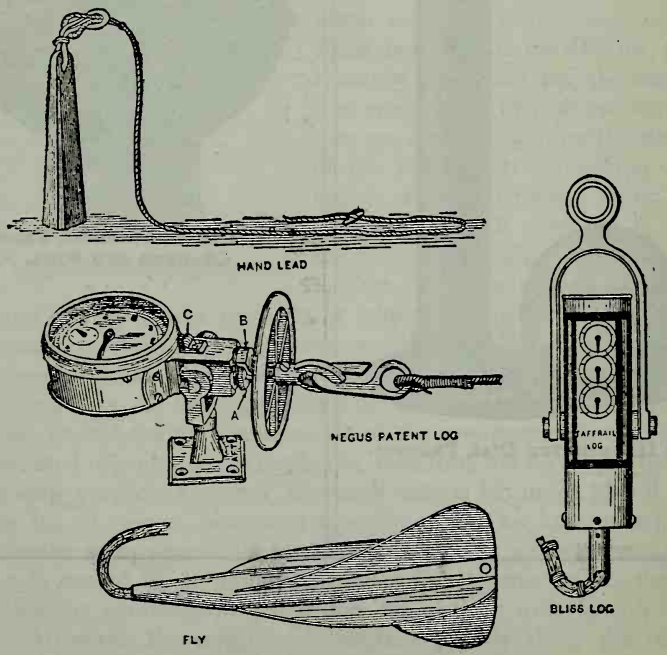


FIG. 38-5—Logs and hand lead.

is so adjusted that it makes a complete turn in a known distance. When clear of the harbor, the rotator is streamed and begins to revolve at a rate commensurate with its speed through the water. These revolutions are transmitted through the line to the *taffrail recorder,* which converts their number into miles steamed. The dial should be read at the time of the streaming because it does not set at zero. The speed through the water may be calculated by dividing the difference in miles between any two readings by the intervening time. Use of the *taffrail log* has been largely discontinued. The reasons for this are: "Speed by revolutions" is fairly reliable; the log becomes inaccurate when fouled by sea weed or other floating objects; the log does not record correctly on, and may interfere with, maneuvers. The log line may be cut by backing and must be taken in before entering harbor.

Both the Nicholson and Forbes logs have a tube projecting into the water through the bottom of the ship. The Nicholson log calculates the speed by the elevation of the water in the tube; the height varying with the changing pressure caused by different speeds. This type log has been found to be impractical and has been practically discontinued. The Forbes log has a propeller projecting from the tube and its rate of turning varies with the speed of the ship. This type log has been placed on some ships.

Any patent log may, by electrical connection, record the speed and miles steamed on a bridge instrument.

SOUNDING

Sounding is the act of determining the depth of water. Soundings may be taken with the hand lead, sounding machines, or the sonic depth finder. *United States Navy Regulations* require use of the hand lead when going into or out of port or approaching an anchorage, shoal, or rock.

Hand lead.—The usual method of taking soundings in moderate depths of water is by hand lead. The hand lead consists of a narrow block of lead, weighing from 7 to 14 pounds, which is attached to a marked line. Depth is found by heaving it forward and reading, by the marks on the line, the depth to which it sinks. With the ship making 12 knots a good leadsman will get reliable soundings up to 7 fathoms. Of course, at slower speeds the lead will have time to sink even deeper before the ship moves up to it. The lead line may also be used for determining the direction in which a ship, practically dead in the water, is moving. This is done by placing the lead on

the bottom and noting the direction of the motion of the ship as shown by the change of direction of the lead line from the up-and-down. The lead should be placed so that it is directly below the leadsman.

Preparatory to heaving the lead, men take station in the "chains," which are usually platforms projecting over each side at the after end of the forecastle. The lead is then dropped over the side and is supported in the heaving hand by a wooden toggle, inserted in the lead line about 2 fathoms from the lead; the spare line is coiled free for running, in the unoccupied hand.

Heaving the lead.—To make the heave, first momentum is gained by swinging the lead like a pendulum. After sufficient momentum has been gained, the lead is swung in a circle over the head. When the force is great enough, the lead is let go as it swings forward and at a point about level with the forecastle. This should cause it to move forward on a line a little above and practically parallel to the deck. As the ship moves ahead the spare line is heaved in rapidly; to get correct readings there must be no spare line out. The marker should be read when the line slacks slightly, on account of the lead touching bottom, or when the line is taut, up and down.

Precaution is necessary in heaving the lead. If the lead is not swung fore and aft or if it is let go at the wrong time, it may land on the bridge or the forecastle and seriously injure a shipmate. If the pull is not even the same thing may occur or, if it is slacked, the lead may drop on the man who is doing the heaving. Ability to heave the lead may only be acquired by practice and it is necessary to practice in both chains. The reason for this is that the right hand is used for heaving from starboard chain, and the left hand for heaving from the port chain.

Marking of lead line.—A good heave has no value unless the depth can be read correctly and quickly. The markings of the line, which are as follows, must be learned:

At 2 fathoms, 2 strips of leather.
At 3 fathoms, 3 strips of leather.
At 5 fathoms, a white rag.
At 7 fathoms, a red rag.
At 10 fathoms, a piece of leather with a hole in it.
At 13 fathoms, the same as at 3 fathoms.
At 15 fathoms, the same as at 5 fathoms.
At 17 fathoms, the same as at 7 fathoms.
At 20 fathoms, 2 knots.
At 25 fathoms, 1 knot.

In addition, lead lines are frequently marked at each half fathom over the range of depths which are most used, and may even have foot marks around the more important depths. Some lead lines are adjusted so that the depth may be read at the level of the chains instead of at the water's edge. This facilitates taking soundings at night. Otherwise, the distance to the water must be subtracted from readings taken at the level of the chains. Each seaman should learn any special markings of the lead line which are used on his ship.

Each sounding should be *reported* to the bridge in a sharp, clear voice. When the sounding agrees with one of the marks, it is reported *By the mark 2, 3, 5,* etc.; when it falls on an even fathom between marks, it is reported *By the deep 4, 6, 8, 9,* etc. If the reading does not give an even fathom, report is made as follows: *A quarter less three, And a quarter, four, And a half, four,* etc. These mean respectively that there is ¼ fathom less than 3 fathoms of water, that there is ¼ fathom more than 4, and that there is a ½ fathom more than 4. If bottom is not reached, the report *No bottom at* * * * is made.

A seaman is frequently detailed to assist in hauling in the lead and to make reports to the bridge by telephone.

Deep-sea lead.—At one time a lead which weighed from 30 to 100 pounds was used for taking deep soundings. This type of lead has a line which is marked every 5 fathoms. This "dipsey" lead was "armed," *i.e.*, it had a tallow-filled hollow at the lower end so that a sample of the bottom would be retained. The "dipsey" lead has been replaced by the sounding machine.

Sounding machine.—There are several types of sounding machines, but nearly all are able to take soundings because water pressure increases with depth at a regular rate. This principle is utilized by lowering to the bottom a ground glass tube or one which is chemically coated on the inside; these tubes are closed by a cap at the upper end. The ground glass, or chemical, retains a mark which indicates the point to which the water rose; by placing the tube against a scale, the depth which corresponds to this mark may be read. The ground glass tube, used in a Tanner-Blish machine (see Fig. 38-6), is the one usually seen. This type of tube can be dried out and used again, preferably after being washed out with fresh water, whereas the chemical-coated tube can only be used once, unless it is certain that the depth of water is greater than the last one recorded by it.

A sounding machine is made up of the apparatus used to get the

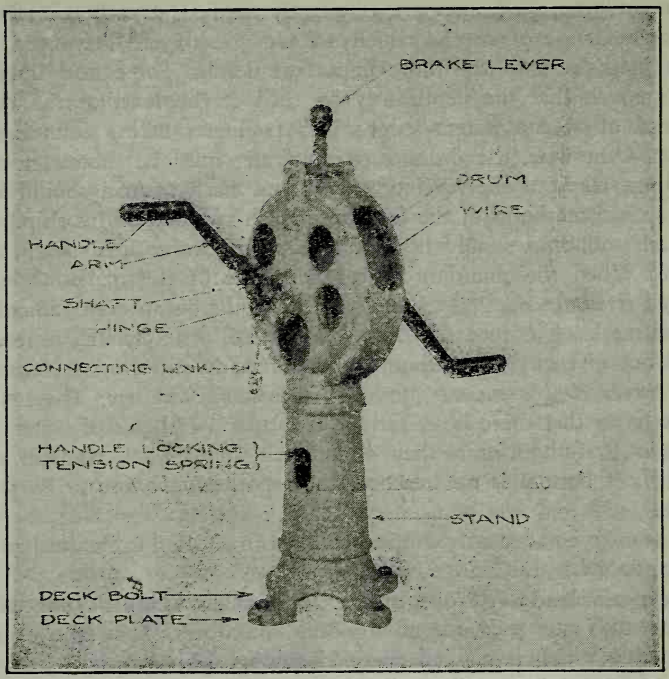


FIG. 38-6—Tanner-Blish sounding machine.

tube to the bottom and back. It consists of a lead, a brass tube, a length of galvanized piano wire, a drum, and a stand. Several hundred fathoms of piano wire are wound on the drum, whose shaft rests on bearings, at each side of the stand. The brass cylinder, in which the glass tube may be inserted, is attached to the end of the wire. Outboard of this tube, the lead, similar to a "dipsey" lead, is secured by a short length of plaited rope. This lead may also be armed in order that the navigator may compare the type of bottom with data given on the chart.

When the lead is released, it draws the wire from the drum, which is free to turn; the speed of the drum, however, may be regulated by a friction brake secured at the top of the stand. The amount of wire out is recorded by a dial on the stand, which must be set before releasing the lead.

To take a sounding, the tube is inserted and the wire is led out by an outhaul to the end of a sounding boom which is suspended over the side. The lead is then lowered gently until it almost touches the water, and the brake is set. When the dial is at zero and everything is ready, the brake is released. As the wire runs out, a feeler is kept on it to determine when the lead strikes the bottom. When the lead does strike bottom, the brake is set, handles are slotted over the square ends of the drum shaft, and the wire is reeled in by hand. In reeling in, one leadsman turns his handle with one hand and guides the wire with a piece of oily waste held in the other. When only about 5 fathoms of wire are out, the outhaul is released and the lead reeled in slowly until it reaches the side.

The sounding machine is usually handled by a quartermaster, but he is assisted by a seaman. The sounding machine may be used without slowing the ship, but deeper soundings can be taken at slower speeds, and the wire may be reeled in much easier.

The sonic depth finder is an electrical apparatus used for determining depth. With it a sound wave is bounced off the bottom, and the depth is calculated by dividing the difference in time between its leaving and returning to the transmitter, because the rate of travel of sound through water is known. Its operation is complicated, and it is usually handled by radiomen.

CHAPTER 39

ELECTRICITY

Nature of electricity 474
Electrical apparatus 476

NATURE OF ELECTRICITY

General.—The exact nature of electricity is not yet known. However, its effect, the laws governing its action, and the methods of controlling it are well understood; this knowledge is sufficient to permit practical use of the energy which electricity develops.

Direct and alternating currents.—Both direct-and alternating-current electricity are in general use. The handling of direct current is simpler, but some instruments depend upon the qualities of alternating current. This makes direct current impractical for use where a large part of the instruments require high voltage. Also, it cannot be carried great distances economically because high voltage is required for this, and raising of the voltage of alternating current is much simpler than raising the voltage of direct current. With the exception of the main propelling plants of electric-drive ships, surface ships of the United States Navy, whose construction was undertaken prior to 1932, are equipped with direct-current plants. Those constructed since that date are equipped with alternating-current plants for ship's service lighting and power. With the direct-current plant, when alternating current is needed for radio, call bell circuits, telephones, etc., a motor generator is installed to change the direct current to alternating current. Likewise, with the alternating-current plant, when direct current is needed, as for searchlights, a motor generator is installed to change the current or, in some installations, provision is made to generate the additional direct current required by making the exciter oversized. Shore plants almost universally supply alternating current. Light globes and heating units may be used with either type of electricity, but motors, motor-driven tools, most radios, etc., are built for use only with one of the two.

Generating electricity.—To develop any type of energy, another type of energy must be expended. In the United States Navy electrical energy is developed primarily by steam-driven (usually turbine) genera-

tors or by the expenditure of chemical energy in a battery. Diesel-driven generators are also being installed for emergency or stand-by use. The making of electricity is too complicated to discuss in this *Manual,* but it may be said that a generator is so designed that it generates electricity by cutting with an electrical conductor the magnetic lines (lines of force) which fill the area around a magnet; a battery generates electricity because electricity will flow between certain kinds of metal which have different chemical qualities when one of each variety is suspended in a particular type of acid.

Flow of electricity.—The flow of electricity may be compared with the flow of water in a pipe. Water flows because of a pressure which is measured in pounds per square inch; electricity flows under a *pressure,* which is measured in *volts.* When a valve is opened on a water line, the rate of discharge is said to be so many gallons per second; when a switch is turned on, the *discharge* from the electrical line is said to be so many *amperes,* which is a simplified name for "coulombs per second." A pipe line has a frictional resistance for water which causes a drop in pressure between the pump and the point of discharge; an electric line offers a *resistance* which is measured in *ohms.* The amount of work which any machine will do in a certain time determines is *power.* Horsepower (1 horsepower represents the work required to raise 33,000 pounds 1 foot in 1 minute) is used to measure the power exerted by a stream of water; electrical *power* is measured in *watts,* but is nearly always expressed in kilowatts, a kilowatt being 1,000 watts. One horsepower is equivalent to 746 watts or, in other words, a kilowatt equals a little over 1¼ horsepower.

Miscellaneous qualities.—There are other miscellaneous qualities of electricity which should be known. Among these is the fact that electricity must be carried to a machine or electrical unit by two wires; it is considered that it enters the machine through one and leaves through the other. These two wires are comparable to the steam supply line and the exhaust line, respectively, of a steam engine. Also, an electric current always produces some heat in the line or machine through which it flows, the amount dependent upon current and resistance. Each line is designed to withstand a certain amount of heat and will carry no more electricity than the design calls for.

Conductors.—Electricity will flow easily through some substances, called conductors, and will not flow through others, known as insulators. Some of the best conductors are silver, copper, aluminum, zinc, brass, platinum, iron, and, in fact, practically all metals. Sea water, charcoal,

carbon, acid solutions, etc., are fair conductors. Marble, cotton, linen, and the human body are partial conductors. Insulators are as follows: glass, paraffin, mica, ebonite, rubber, shellac, gutta-percha, sulphur, sealing wax, wood, silk, leather, paper, porcelain, etc. However, wood, silk, leather, and paper become partial conductors when wet. Most electrical wires are made of copper, and rubber is the most general insulator for wiring.

Grounds.—If a wire is connected to the metal of the ship, the circuit is said to be *grounded*. These grounds frequently occur accidentally and do no particular harm at the time if only one wire touches. However, if the other wire touches, the electricity is diverted from its normal path, through the wires, and takes the "short cut" through the metal of the ship; this is called a *short circuit* and renders the circuit useless. Grounds may be caused in telephone and call-bell circuits by such a small object as a piece of verdigris, and electrician's mates spend a great deal of their time looking for these grounds.

ELECTRICAL APPARATUS

Equipment.—The electrical apparatus with which a seaman may come in contact are: generators, motors, motor generators, starting panels, switches, circuit breakers, fuses, controllers, lights, telephones, call bells, batteries, meters, and radio gear.

Generators.—Generators are the machines which make electricity for a ship's power and lighting circuits. They are usually located either in the dynamo room or the engine-room, and, on large ships, distribution boards with master switches control the course of electricity through the ship. D-c generators and motors both have revolving armatures; copper strips, called commutator bars, are usually attached to these and have small oblong pieces, called brushes, riding on them. In a-c generators the field usually revolves and the current is taken from the generator or supplied to the motor through the stator or stationary wiring attached to the frame.

The action of the generator on an electric line is similar to the action of the pump on the fire main, in that both require little steam to maintain pressure when nothing is being used from the line. However, in case of fire, the engine-room must be immediately notified so that it may speed up the pumps as necessary to keep the water supply in the fire main; the dynamo room, or engine-room, should also be notified *before* a searchlight or any appartus using a large amount of electricity is cut

in. If this is not done, too great a load will be thrown on the generator, and it may even be stopped.

Motors.—Motors are similar in appearance to generators, but, instead of supplying electrical energy, they are driven by electricity, which they convert to other useful energy. Both motors and generators come under the common name of dynamos. There are numerous motors on board ship, as crane motors, winch motors, ventilating motors, fan motors, small motors built into portable power tools, etc. Sparks may often be seen where the brushes pass over the commutator bars. This is an improper condition and should be reported to the division officer.

Motor generators are double-unit electrical machines; driving power is supplied to a generator by a motor. The motor may be driven by direct current and the generator make alternating current.

Starting panels.—when a motor is running, it bucks to some extent the electricity running through it. However, before the motor gets up to speed, this bucking influence has not been built up, and the motor will consequently take a great many more amperes than is normal. This abnormal amount of electricity might burn up the motor, and a starting panel is installed on the larger motors to prevent this.

There are several types of starting panels, but in general they are in boxes on the bulkhead and consist of a lever arm which, when pushed to the right, starts the motor by making contact, at the handle, with successive buttons. These buttons are called contacts, and each controls some of the resistance which has been put in the line to counteract the abnormal amperage present while the motor is working up to speed. As the motor speeds up and furnishes more bucking influence, the mechanical resistance may be gradually taken out by advancing the handle. A panel type controller must never be advanced too rapidly, because this will cause the motor to trip out or damage to be done to it. Starting panels are constructed so that a magnet keeps the handle up as long as power is on, but when the power goes off the magnet loses its magnetic influence and the handle is pulled to the *off* position by a spring. A starting panel will not remain on any button, but stays shut only when advanced all the way. Stopping an electrical machine without cutting off the power causes an abnormal flow of electricity from which the unit is not protected. In other words, stopping a fan by holding a pencil against the blades, or by laying clothing so that it may be caught and thus jam the blades, may burn up the fan.

Switches.—Switches are used to turn electricity on or off a particular circuit or unit. There are various types of switches, varying from ordi-

nary light switches to huge knife switches, which are copper bars joined by an insulated handle. Most starting panels have a knife switch inclosed in the panel box; this switch must be closed before the motor can be started by the controller.

The amount of electricity which flows through a switch is often so great that it will jump a short intervening space, between the switch and the contact; this causes a bright flame which is known as an arc. A person may be seriously burned by an arc, his eyes damaged or the switch may be melted. Most large switches are provided with a device to help prevent arcs, but for the sake of safety a switch should be completely closed or opened with one quick movement. A switch should always be held by the insulated handle, and the hands should be dry before it is touched.

Circuit breakers are installed in all main units of an electrical line for protection of machinery. They consist of carbon contacts, on the upper ends of copper arms, and copper contacts which seat against fixed contacts; they are provided with wooden handles, which must be pressed down to close the circuit, and insulated buttons beneath, which are pressed upward to trip the breakers out by hand. Circuit breakers are so built that they remain closed as long as the line is in all respects normal, but trip out if there is an overload on the line or the current goes off. Panel boxes frequently have a circuit breaker inside, and this must be closed before the motor can be started. (The circuit breaker takes the place of the switch.) A circuit breaker must never be held shut if it will not stay closed. Call an electrician! The man who holds a circuit breaker closed or who puts too large a fuse in a line belongs in the same class with the one who looks in his gasoline tank with a lighted match.

Fuses are protective devises installed in electrical circuits. They usually protect some small part of a circuit, the whole of which is protected by a circuit breaker. (There are always fuses in the panel boxes which do not have circuit breakers, and usually fuses, as well as circuit breakers, protect large motors.)

Each electrical circuit is built to carry so much power and no more; for instance, the electric light wires of a division's living quarters may be designed to carry 10 amperes regularly and as much as 15 amperes for a short time. To guarantee that this circuit will not be submitted to more than 15 amperes, a lead wire which will melt if that amount of electricity runs through it is installed in the line; this is a fuse. These lead wires come in different sizes because different lines are constructed to carry different amounts of electricity; and the size which each circuit must have is described in the wiring specifications. Fuses are usually

inclosed in glass or other insulating material, to protect personnel from the arc which is formed when the fuse burns out, and also from the current. Two fuses may look alike and yet carry different size lead wires; therefore, the rating must be ascertained. The use of too many heaters, percolators, large portable power tools, etc., on a circuit will frequently blow fuses, because they draw more amperage than that for which a lighting circuit is designed. When a fuse has been blown, an electrician should be called, but if it becomes absolutely necessary for a seaman to install a fuse, he should observe the following precautions:

(1) Never put in a larger fuse than that for which the line is designed.

(2) Never continue to renew fuses which keep blowing, because trouble in the line is indicated, and this must be corrected before the line can be used.

(3) Always stand on a good, dry, insulating material when renewing a fuse; never in water.

(4) Always grasp the fuse by the insulated part and preferably with a wooden clip, like a patent clothespins.

Controller.—Starting panels are really controllers, but the kind actually considered as controllers are the drum type, like those used on a street car. These are installed for controlling steering motors, winches, cranes, anchor engines, etc.; with them the speed may be controlled or the direction of the motor reversed. The handle is all that is used by a seaman, and he should never take off the cover. The only precautions are to keep dirt and water out of the inside, and to allow the motor to work up to speed before advancing the handle to a higher notch.

Lights.—Standard lighting circuits aboard ship are 120-volt circuits, and the lights are connected in what is known as parallel. Most ships are equipped with a 3-wire circuit from which 240-volt outlets are installed for power apparatus. Light globes and other electrical appliances are designed for use with a particular voltage, and should not be used on a circuit whose voltage is more than 5 to 10 volts different from this. Serious damage may be done when an electrical instrument is plugged in on a circuit whose voltage is much higher than that for which the instrument was designed; a light globe designed for use on an 8-, 10-, 15-volt battery circuit will immediately blow if plugged in on the ship's circuit. If a light globe is put on a line whose voltage is lower than that indicated as required, by the marking on it, it will burn more dimly than normal. Twelve 10-volt lamps could be connected *in series* on a 120-volt circuit, but since a seaman seldom comes in contact with series wiring, it will not be discussed.

Metal or fingers must never be put in open light sockets. Metal will

cause a short circuit, blow fuses, and probably burn up the sockets; fingers will probably do the same, and, in addition, a shock will be received which might be fatal.

Wiring and fittings.—Short circuits and grounds have already been discussed. To avoid causing grounds or short circuits, wiring and fittings must be handled carefully. Metal tools should never be laid across naked wires or left in the vicinity of electrical machinery. Care must be taken not to break the insulation on wires, as by striking them with a file scraper while removing paint, boring into them with a drill, etc. Water will ground or short-circuit fittings; consequently, caps must always be replaced on outlets, junctions boxes must be kept closed, water must not be used carelessly around electrical leads, etc. Any carelessness in respect to any of these things causes a great deal of work for the electrician's mates, temporarily loses for everyone the use of valuable apparatus, and may even destroy electrical gear or cause serious personal injury.

Fans are for the comfort of all; they should not be run when not needed, should not be used as toys, and an electrician should be notified if they seem to spark excessively or run hot.

Heaters.—Electric heaters draw quite a bit of amperage and must not be used unless authorized, and then only when needed.

Telephones are delicate instruments and must be handled with care. Battle telephones must be neatly secured and put in their proper containers when the need for them is over. All phones must be kept clean and free from verdigris. Good service is dependent upon proper handling of the phones.

Call bells require the same careful handling as telephones. A small amount of verdigris on a call-bell circuit may cause the tab to remain down continuously and thus make it impossible to tell where a call comes from.

Batteries are used for numerous purposes on board ship, as on gun-firing, sight lighting, auxiliary lighting circuits, etc. These batteries are important, and most battery trouble is caused by neglect or misuse of the battery. Even seaman should obey the following precautions:

(1) Never lay a tool or metal of any kind on a battery.

(2) Never approach the vicinity of a charging battery with a naked light, and it is safer to keep naked lights away from all batteries.

(3) Never throw salt water on a battery or in such a way that it may splash on a battery. Salt water damages connections and causes poisonous chlorine gas to come from lead batteries.

(4) Always handle batteries carefully, because they are easily damaged.

(5) Never attempt to test a battery, renew the electrolyte, or handle it in any way. An electrician should be called if a battery requires any attention; he is trained to care for it.

Meters and electrical instruments.—All electrical instruments are delicate; they should not be handled, nor should they be needlessly jarred.

Radio gear should never be touched. A radio antenna should never be approached if it is being used for transmitting. Before going aloft, permission must be secured from the officer of the deck in order that he may warn the radio room.

General precautions.—Never attempt to alter or repair any electrical gear unless it is absolutely necessary; electrician's mates are provided for this duty.

Never touch a live line, and be particularly careful around any electrical apparatus if your hands are wet, or if it is necessary for you to stand in water.

Never allow naked wires in the vicinity of gasoline or other explosives.

Gasoline flowing through a pipe can generate electricity, and the amount may be increased if the gasoline is strained through chamois. If a gap is allowed between the filling pipe and the tank, the electricity may jump the intervening space, as a spark, and explode the gasoline. Hence, a gasoline filling pipe must be connected to the tank, be grounded, at a place some distance from the filling hole, and gasoline must never be strained through chamois.

Never paint screw threads, label plates, hinges, etc., of electrical fittings.

Keeping up the electrical equipment of a ship involves much work, and the electrical gang is able to do it only when all hands assist by taking proper precautions. When a seaman disregards any of the precautions, he causes unnecessary work and usually lessens the comfort and safety of himself and his shipmates.

CHAPTER 40

CARRYING THE AUTOMATIC RIFLE AND SUBMACHINE GUN

Rules governing carrying of the automatic rifle 482
Rules governing carrying of the submachine gun 483

RULES GOVERNING CARRYING OF THE AUTOMATIC RIFLE

(1) Normally, the automatic rifle is slung over the right shoulder, butt down, barrel to the rear (see Fig. 40-1). This position is assumed at the command *FALL IN* and during ceremonies and drills.

FIG. 40-1—Carrying the automatic rifle.

(2) During marches and field exercises, the automatic rifle may be carried slung over either shoulder.

(3) The automatic rifle is unslung at the command *REST,* unless otherwise ordered. It is reslung as prescribed for drills and ceremonies at the command *Attention.*

(4) At the command *At ease,* automatic riflemen, without unslinging their weapon, assume the position as without arms.

(5) The automatic rifleman does not execute the manual of arms except:

(*a*) 1. *Parade,* 2. *REST.* Execute the movement as without arms, except that the right hand retains its grip on the gun sling.

(*b*) 1. *Inspection,* 2. *ARMS.* At the command *ARMS,* grasp the magazine with the left hand, at the same time pressing the magazine release with the right hand. Withdraw the magazine with the left hand and place in belt. Pull back the operating handle with the left hand. *"Inspection arms" is a safety precaution.*

(*c*) Being at inspection arms: 1. *Order (Port, Right shoulder,* etc.), 2. *ARMS.* At the command *Order,* pull the trigger, replace the magazine, and resume the position of attention, the automatic rifle being kept slung.

(6) When arms are stacked, the automatic rifle is placed on the stack as prescribed for a loose gun.

(7) The automatic rifle belt is worn whenever the automatic rifle is carried.

(8) Men armed with the automatic rifle salute with the hand salute when not in ranks. In ranks they do not salute.

RULES GOVERNING CARRYING OF THE SUBMACHINE GUN (THOMPSON)

(1) Normally, the submachine gun is slung over the right shoulder, butt down, barrel to the rear (see Fig. 40-1). This position is assumed at the command *FALL IN* and during ceremonies and drills.

(2) For marches and field exercises, the submachine gun may be similarly carried over either shoulder.

(3) The submachine gun is carried unslung at the command *REST,* unless otherwise ordered. It is reslung as prescribed for drills and ceremonies at the command *Attention.*

(4) At the command *At ease,* submachine-gun men, without unslinging their weapon, assume the position as without arms.

(5) The submachine-gun man does not execute the manual of arms except:

(*a*) 1. *Parade,* 2. *REST.* If arms are slung, execute the movement as without arms, except that the right hand retains its grip on the gun sling.

(*b*) 1. *Inspection,* 2. *ARMS.* At the command *ARMS,* unsling the gun, grasp the piece with the right hand over the receiver, press up on the magazine catch with the right thumb, withdraw the magazine with the left hand and place in belt. With the left hand grasp the piece by the pistol grip and with the right hand move the actuator to the rear. Change the grasp of the right hand to the small of the stock. After unslinging the gun it is held, as far as practicable, in the same relative position as for the rifle at Port arms. *"Inspection arms" is a safety precaution.*

(*c*) Being at inspection arms: 1. *Order (Port, Right shoulder,* etc.)', 2. *ARMS.* At the command *Order,* pull the trigger with the right forefinger, grasp the receiver with the right hand, and replace the magazine with the left. Sling the piece at the command *ARMS.*

(6) When arms are stacked, the submachine gun is placed on the stack as prescribed for a loose gun.

(7) The submachine-gun web belt and magazine cases are worn whenever the submachine gun is carried.

(8) Men armed with the submachine gun salute with the hand salute when not in ranks. In ranks they do not salute.

CHAPTER 41

CART DRILL

The cart.—The cart is a small, hand-drawn, two-wheeled vehicle designed for the transport of infantry weapons, ammunition, and material. It is particularly useful for machine-gun and special-weapon companies. Though constructed to carry 1,000 pounds, service loads should be limited to about 600 pounds.

Basis of cart drill.—The machine-gun squad is the basis for cart drill because it is so equipped. The drill of units equipped with carts is, with the variations herein described, executed by the same commands and generally in the same manner as for the rifle squad, platoon, and company. The purpose of this section is to cover only such variations in commands and movements as are necessary for units equipped with carts. *With little modification, this drill is applicable to any unit equipped with hand-drawn vehicles.*

General rules.—(*a*) *Cart,* unless otherwise indicated, refers to each cart and its crew.

(*b*) *Squad* refers to the men of the squad and to the 2 carts with which equipped.

(*c*) *Drags* are the horizontal handles at right angles to the tongue of the cart.

(*d*) *To man the drags.*—The drag is always gripped at the outer end with both hands, backs of the hands up, thumbs down.

(*e*) *To change direction.*—When changing direction with carts, drag handles are raised shoulder high until the turn has been completed.

(*f*) *Application of infantry drill.*—Units equipped with carts execute *Eyes right (left), Halts, Forward march, Half step, Double time, Quick time, At ease, Rest, Fall in, Fall out,* and *Alignments* generally as prescribed for rifle units.

(*g*) *Guides.*—The same rules apply as for guides of rifle units.

(*h*) *Men armed with the rifle.*—At formations, drills, and ceremonies, the rifle is carried slung over the right shoulder or slung diagonally across the back, muzzle up, sling over the left shoulder. Men so armed do not execute the manual except that rifles are ordered unslung prior to the command *Inspection arms,* or when specially directed.

(*i*) *To halt.*—If marching, the squad halts at the command *HALT, Action, By hand,* or *On wheels.*

(*j*) *Grounding drags.*—Drags are grounded at the original assembly and at the command 1. *Ground,* 2. *DRAGS.* Each dragman places the drags directly in his front. At the command *HALT* men remain at the drag position until the command 1. *Ground,* 2. *DRAGS* is given.

(*k*) *Taking drags.*—Before starting any movement the command 1. *Man,* 2. *DRAGS* is given before the command for movement. Dragmen take the drags from the ground and hold them as described above.

Organization of the squad.—Normally, the squad equipped with carts consists of a petty officer (squad leader) and 8 nonrated men. Equipping the squad with 2 carts does not necessitate a change in its organization.

To form the squad.—(*a*) The squad leader (instructor) places himself 3 paces in front of where the center of the squad is to be and commands *FALL IN.*

(*b*) Men fall in at the carts as indicated in Fig. 41-1, align themselves to the right, and ground the drags.

(*c*) The squad leader then commands *NUMBER OFF.* All except the right file execute *Eyes right* and, beginning on the right, they number off from right to left as follows: *one, two, three, four, five, six, seven, eight.* Each man turns his head and eyes to the front as he numbers off.

(*d*) The squad leader then inspects pistols and rifles as for rifle units.

(*e*) When the squad is part of a larger unit, the squad leader takes post as an additional file on the right flank of his squad as shown in Fig. 41-1.

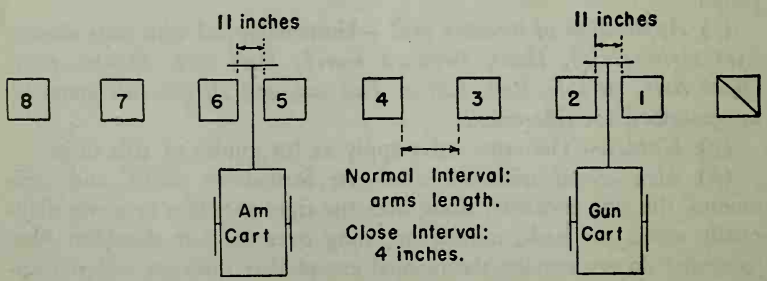


FIG. 41-1—The squad in line as part of a larger unit.

To align the squad.—Executed by the same commands and in the same manner as for the rifle squad, except that Nos. 1 and 5 do not raise their left arms or elbows.

Parade rest.—Executed by the same commands and in the same manner as prescribed for a rifle squad, except that dragmen lower the drags to the full extent of their arms.

Present arms.—Executed by the same commands as prescribed for a rifle squad. Dragmen stand fast, others execute the hand salute.

The oblique march.—Being in any formation, to oblique or to resume the original direction from the oblique, the commands are the same as for a rifle squad. At the command *MARCH,* carts turn 45 degrees to the right (left) in marching and continue in the new direction, retaining their relative positions without attempting to bring the carts abreast. The command *HALT* is not given during the oblique.

To move to the rear.—(*a*) Being at a halt or mark time, to move not more than 5 paces to the rear, the command is: 1. *Backward,* 2. *MARCH,* 3. *Squad,* 4. *HALT.* Executed as prescribed for the rifle squad.

(*b*) Being at a halt or mark time, to move more than 5 paces to the rear the command is: 1. *To the rear by hand,* 2. *MARCH,* 3. *Squad,* 4. *HALT.* At the command *To the rear by hand,* dragmen move to the front of the drags and face the rear. Other men face about. At the command *MARCH,* all step off with the full step. At the command *HALT,* men halt, take original posts, and face to the front.

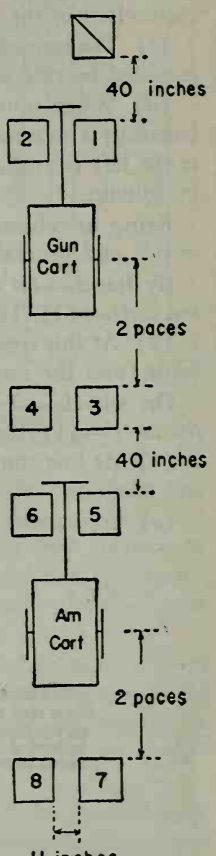


FIG. 41-2—The squad in column as part of a larger unit.

Individual cart movements.—(*a*) *Being in line to form column of carts to a flank.*—(1) The command is: 1. *Carts right (left),* 2. *MARCH.*

(2) At the command *MARCH,* each cart executes *Cart right.* Dragmen wheel the carts to the right, pivoting the cart on the right wheel, and halt. Other men, moving by the most convenient and direct route, place themselves in the positions indicated in Fig. 41-2 and halt.

(*b*) *Being in column of carts, to form line to a flank.*—The commands and the movements of the dragmen are the same as in par. (*a*). Other men, moving by the most convenient and direct route, place themselves in the positions indicated in Fig. 41-1 and halt.

(*c*) The movements described above correspond to *Right (left) face* executed by rifle units.

(*d*) When units equipped with carts and rifle units execute simultaneously a movement from line to column, carts must incline slightly to the left (or right) when the march is next resumed, in order to cover in column.

Being in column, to change direction.—Executed by the same commands and generally in the same manner as prescribed for rifle units.

By hand.—*To remove weapons, equipment, and ammunition from the carts.*—(1) The command is *BY HAND.*

(2) At this command drags are grounded, men take their respective loads from the carts and proceed as directed.

On wheels.—*To replace weapons, equipment, and ammunition on the carts.*—(1) The command is *ON WHEELS.*

(2) At this command men replace their respective loads on the cart and take post.

(*a*) Formations for the platoon are shown in Figs. 41-3 and 41-4.

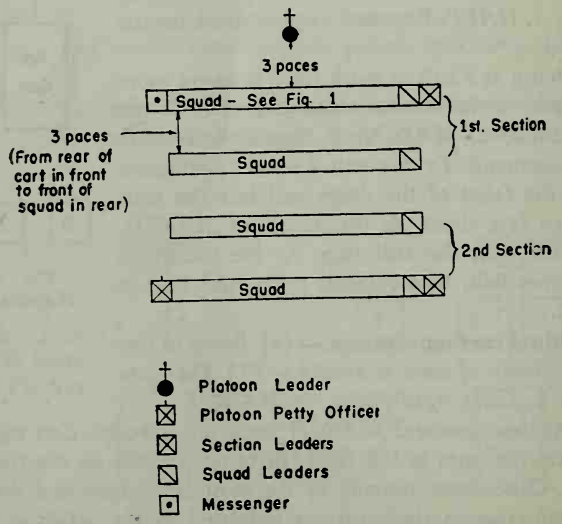


FIG. 41-3—The platoon in line.

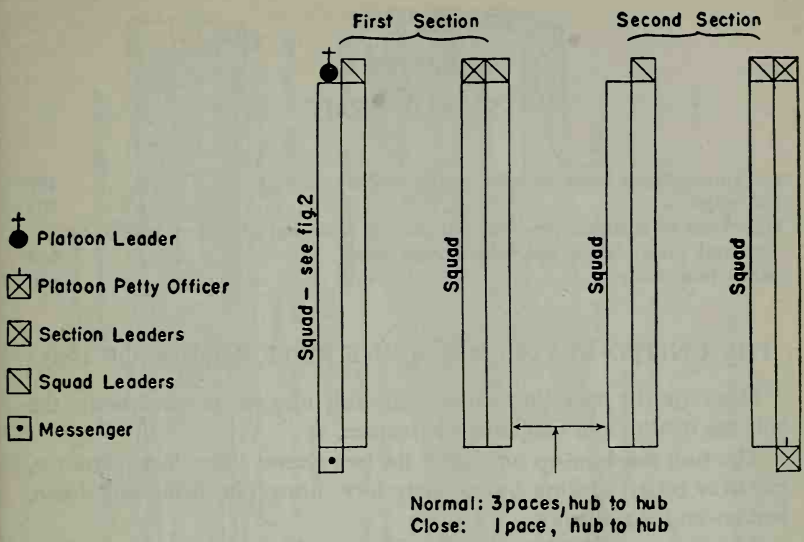


FIG. 41-4.—The platoon in column.

(*b*) Being in march with the carts in column of twos, threes, or fours, the platoon closes and extends the interval by the same commands and generally in the same manner as for a rifle platoon. Units equipped with carts do not execute these movements from a halt.

(c) *Being* at a halt with carts, the platoon forms column of twos (double column of carts), reforms column of fours, forms single file (single column of carts) and reforms column of three (or fours), by the same commands and generally in the same manner as for a rifle platoon.

The company.—Two or more cart platoons will be formed as a company. Formations and movements employed are generally the same as for a rifle company.

CHAPTER 42

SMALL ARMS

The United States magazine rifle, model of 1903 490
The pistol 504
The object of sighting, position, and aiming drills and of gallery practice; general principles of individual range firing 508
Safety precautions 510

THE UNITED STATES MAGAZINE RIFLE, MODEL OF 1903

MOST OF the operating parts of the rifle may be included under the bolt mechanism and magazine mechanism.

The bolt mechanism consists of the bolt sleeve, sleeve lock, extractor, extractor collar, cocking piece, safety lock, firing pin, firing-pin sleeve, striker, and mainspring.

The bolt moves backward and forward, and rotates in the well of the receiver; it carries a cartridge, either from the magazine, or one placed by hand in front of it, into the chamber and supports its head when fired.

The sleeve unites the parts of the bolt mechanism, and its rotation, with the bolt, is prevented by the lugs on its sides coming in contact with the receiver.

The hook of the extractor engages in the groove of the cartridge case, and retains the head of the latter in the countersink of the bolt until the case is ejected.

The safety lock when turned to the left is inoperative; when turned to the right, which can only be done when the piece is cocked, the point of the spindle enters its notch in the bolt and locks the bolt; at the same time its cam forces the cocking piece slightly to the rear, out of contact with the sear, and locks the firing pin.

The magazine mechanism includes the floor-plate follower, magazine spring, and cut-off.

To charge the magazine, see that the cut-off is turned up, showing *on;* draw the bolt fully to the rear, insert the cartridges from a clip or from the hand, and close the bolt. To charge the magazine from a clip, place either end of a loaded clip in its seat in the receiver and, with the thumb of the right hand, press the cartridge down into the magazine until

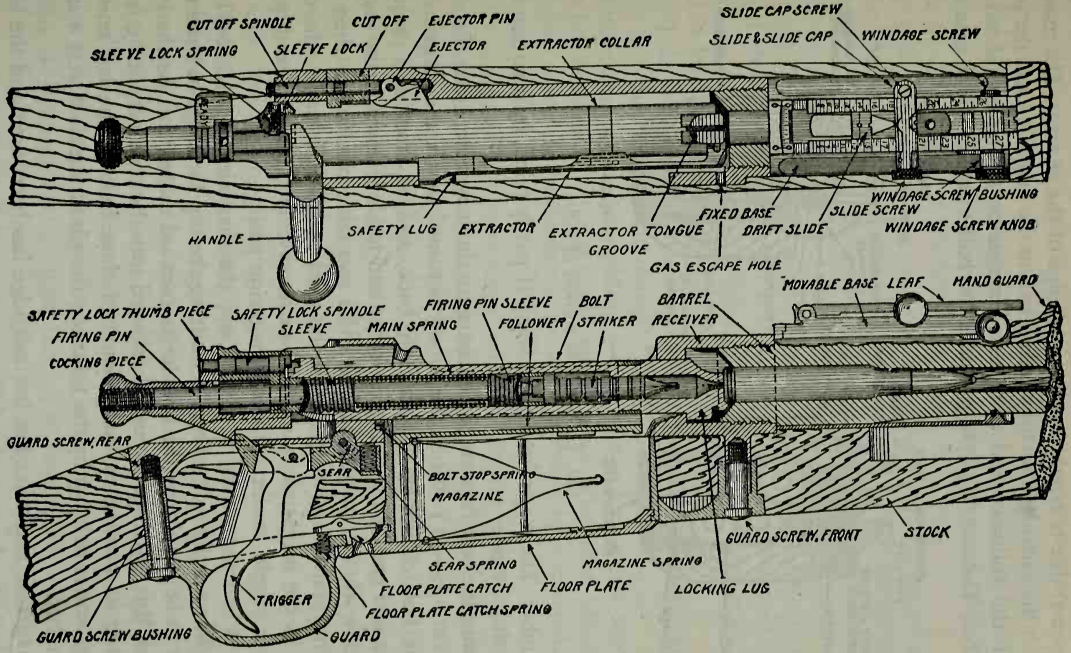


FIG. 42-1—Top and longitudinal section of rifle.

the top cartridge is caught by the right edge of the receiver. The manner in which the cartridges arrange themselves in the magazine and the position of the follower and compressed magazine spring are shown in Fig. 42-2. The cartridge ramp guides the bullet and cartridge case into

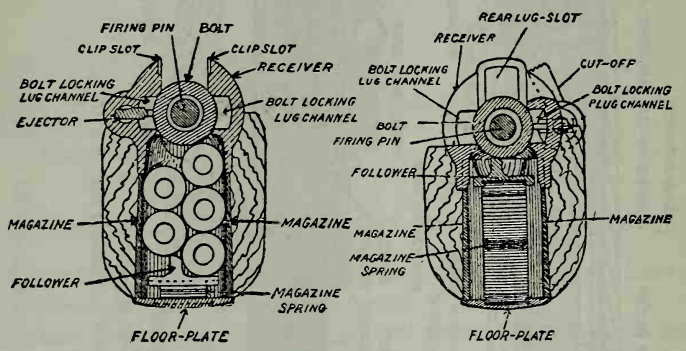


FIG. 42-2—Cross section of rifle.

the chamber. The magazine can be filled, if partly filled, by inserting cartridges one by one.

Pushing the bolt forward, after charging the magazine, ejects the clip.

The cut-off.—(1) When the *cut-off* is turned down, the magazine is *off*. The bolt cannot be drawn fully back, and its front end projects over the rear end of the upper cartridge and holds it down in the magazine below the action of the bolt. The magazine mechanism then remains inoperative and the rifle can be used as a single loader, the cartridges in the magazine being held in reserve. The rifle can readily be used as a single loader with the magazine empty.

(2) When the *cut-off* is turned up, the magazine is *on*. The bolt can be drawn fully to the rear, permitting the top cartridge to rise high enough to be caught by the bolt in its forward movement. As the bolt is closed, this cartridge is pushed forward into the chamber, being held up during its passage by the pressure of those below. The last one in the magazine is held up by the follower, the rib of which directs it into the chamber.

In magazine fire, after the last cartridge has been fired and the bolt drawn fully to the rear, the follower rises and holds the bolt open to show that the magazine is empty.

Precautions.—(1) If it is desired to carry the piece cocked with a cartridge in the chamber, the bolt mechanism should be secured by

turning the safety lock to the right. Under no circumstances should the firing pin be let down by hand on a cartridge in the chamber.

(2) To obtain positive ejection and to insure the bolt catching the top cartridge in the magazine, when loading from the magazine, the bolt must be drawn fully to the rear in opening it.

(3) When the bolt is closed or slightly forward, the cut-off may be turned up or down as desired. When the bolt is in its rearmost position, to pass from loading from the magazine to single loading, it is necessary to force the top cartridge or follower below the reach of the bolt, to push the bolt slightly forward, and to turn the cut-off down, showing *off*.

(4) In case of a misfire it is unsafe to draw back the bolt immediately, as it may cause a hangfire. In such cases the piece should be cocked by drawing back the cocking piece.

(5) It is essential for the proper working and preservation of all cams that they be kept lubricated.

Dismounting and assembling.—The bolt and magazine mechanism can be dismounted without removing the stock. The latter should never be done except for making repairs, and then only by a selected and instructed man.

To dismount bolt mechanism.—(1) Place the cut-off at the center notch; cock the arm and turn the safety lock to a vertical position, raise the bolt handle, and draw out the bolt.

(2) Hold bolt in left hand, press sleeve lock in with thumb of right hand to unlock sleeve from bolt, and unscrew by turning to the left.

(3) Hold sleeve between forefinger and thumb of the left hand, draw cocking piece back with middle finger and thumb of right hand, turn safety lock down to the left with the forefinger of the right hand to allow the cocking piece to move forward in sleeve, thus partially relieving the tension of mainspring. With the cocking piece against the breast, draw back the firing-pin sleeve with the forefinger and thumb of right hand and hold it in this position while removing the striker with the left hand. Remove firing-pin sleeve and mainspring; pull firing pin out of sleeve; turn safety lock thumb piece to the right on sleeve and draw it to the rear through the groove made in sleeve for this purpose. Turn the extractor to the right, forcing its tongue out of its groove in the front of the bolt, and force the extractor forward and off the bolt (see Fig. 42-3).

To assemble bolt mechanism.—(1) Grasp with the left hand the rear of the bolt, handle up, and turn the extractor collar with the thumb and forefinger of the right hand until its lug is on the line with the safety

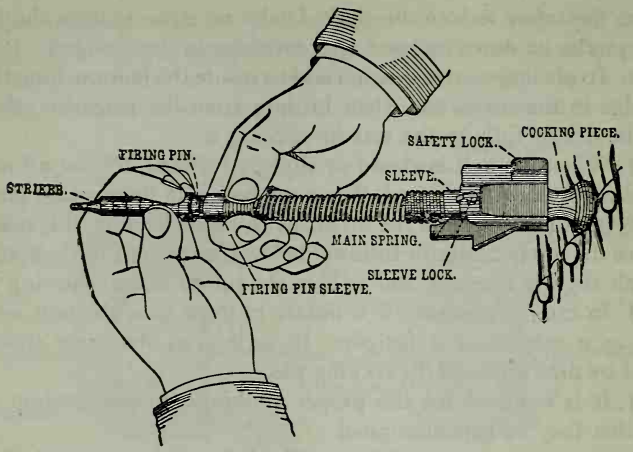


FIG. 42-3—Firing pin and parts.

lug on the collar in the undercuts in the extractor by pushing the extractor to the rear until its tongue comes in contact with the rim on the face of the bolt (a slight pressure with the left thumb on the top of the rear part of the extractor assists in this operation) ; turn the extractor to the right until it is over the right lug; take the bolt in the right hand and press the hook of the extractor against the butt plate, or some rigid object, until the tongue on the extractor enters its groove in the bolt (see Fig. 42-4).

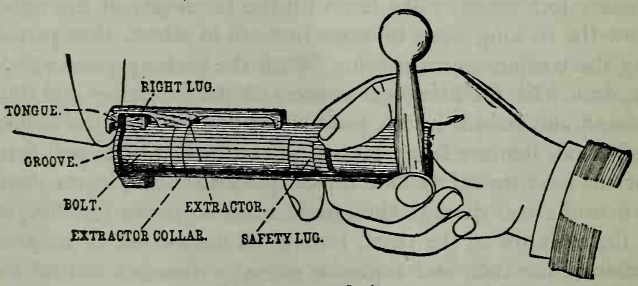


FIG. 42-4—Rifle bolts.

(2) Place the safety lock, through the dismounting groove, into position on the sleeve and turn it down to the left to permit the firing pin

to enter the sleeve as far as possible; place the cocking piece against the breast and put on mainspring, firing-pin sleeve, and striker. Holding the cocking piece between the thumb and forefinger of the left hand, draw the cocking piece back with the thumb and middle finger of the right hand, and turn the safety lock to a vertical position and the forefinger of the right hand; insert the firing pin in the bolt and screw up the sleeve (by turning it to the right) until the sleeve lock enters its notch on the bolt.

(3) See that the cut-off is at the center notch; hold the piece under floor plate in the fingers of the left hand, the thumb extending over the left side of the receiver; take bolt in right hand with safety lock in a vertical position and safety lug up; press rear end of follower down with left thumb and push bolt into the receiver; lower bolt handle; turn safety lock and cut-off down to the left with right hand.

To dismount magazine mechanism.—(1) With the bullet end of a cartridge, press on the floor plate catch (through the hole in the floor plate), at the same time draw the bullet to the rear; this releases the floor plate.

(2) Raise the rear end of the first limb of the magazine spring high enough to clear the lug on the floor plate and draw it out of its mortise; proceed in the same manner to remove the follower.

(3) To assemble magazine spring and follower to floor plate, reverse operation of dismounting.

(4) Insert the follower and magazine spring in the magazine, place the tenon on the front end of the floor plate in its recess in the magazine, then place the lug on the rear end of the floor plate in its slot in the guard, and press the rear end of the floor plate forward and inward at the same time, forcing the floor plate into its seat in the guard.

Operation of the rifle.—Unless the bolt is drawn fully back the ejector will fail to work, and in magazine fire this will cause a jam.

When a misfire occurs, press the bolt handle well down, pull the cocking piece to the rear, and try again. Unless the bolt handle is fully down, the firing pin does not strike with full force. Almost all misfires are due to faulty operation of the bolt.

See that the guard screws are kept tight. Loose guard screws not only prevent good shooting but also interfere with the proper feeding of cartridges from the magazine, often resulting in a jam.

For practicing the motions of rapid fire with the rifle unloaded, turn the cut-off down or *off;* otherwise the bolt cannot be worked back and forth.

Fouling of the rifle bore.—The rifle is a weapon of precision and demands proper care and cleaning. A lack of care soon ruins its accuracy.

After a day's shooting the bore demands special attention, as the residuum from smokeless powder soon corrodes it and should be removed as soon as practicable. There are three kinds of fouling:

(1) A black deposit, easily removed by oily rags.

(2) An acid deposit which comes from the primer and is forced into the texture of the steel. This acid "sweats" out of the steel gradually, and, unless removed, causes rust. It can be best taken out by fresh water and a bristle brush.

(3) Metal fouling, caused by particles of the cupro-nickel jacket of the bullet adhering to the bore. Fouling of this type rarely occurs with the present ammunition. The removal of metal fouling is impracticable in the field, and may cause serious damage to the bore at any time, if done by an inexperienced man.

Cleaning the rifle.—(1) Remove the bolt and *clean from the breech end. Never clean from the muzzle.*

(2) First clean the bore with the cleaning rod and a small piece of cloth about 1½ inches square, then lightly oil the bore with an oiled rag. The metal and working parts also should be cleaned with dry rags and then lubricated with a slightly oiled rag to prevent rusting and to grease working parts.

(3) Only a small amount of light oil should be used, because any surplus oil makes the rifle disagreeable to handle, collects dirt and grit which finds its way into and around the bolt mechanism, and often flies back into the firer's face and eyes when he fires. The bolt handle should be dry and entirely free from oil; otherwise it is difficult to grasp the bolt firmly to operate it.

(4) If available, a saturate solution of soda and water may be used to clean the bore, but the bore must be thoroughly dried with dry patches of cloth, before oiling. The following mixture is also excellent for cleaning: Amyl acetate, 2 parts; acetone, 2 parts; gas-engine oil, 1 part. Dissolve the oil in the acetate and add the acetone.

(5) Whatever the method of cleaning, the bore should be cleaned daily for several days.

(6) Cosmoline, machine oil, or any oil which will not rust the metal, is suitable for oiling rifles. Sperm oil is the best for lubricating metallic bearing and contact surfaces; a somewhat heavier oil for the bore. Never use emery or any material which will scratch the metal.

(7) The stock and hand guard may be coated with raw linseed oil and polished by rubbing with the hand.

Aiming.—There are several different open-sight notches on the rear sight, but the peep sight is recommended for all firing.

In aiming, the eye should be held as close as possible to the peep, *i.e.*, almost up to the comb of the firing pin. Then aim at the point it is desired to hit, *keeping the top of the front sight centered in the peep hole*, as shown in Fig. 42-5. *When the target (or bull's-eye) appears ill-*

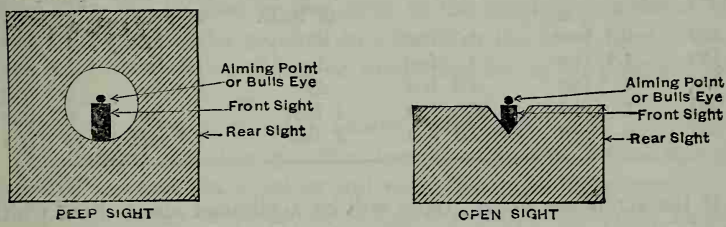


FIG. 42-5.—Peep and open sights.

defined or so small as to be covered by the front sight, aim should be taken at the lower edge of the target or bull's-eye, since an exact aim is very difficult to maintain when the target is even temporarily obscured by the sights.

With any open sight, always aim so that the front sight is centered in the rear-sight notch and just fills the notch, *i.e.*, is just even with the top of the rear-sight notch, as shown in Fig. 42-5. Then aim at the point it is desired to hit, or if the target is small, let it rest on top of the front sight in the manner explained for the peep sight.

The battle sight (open sight with sight leaf down) is the only kind of open sight which, because of sudden and unexpected emergency in the field, may have to be used. The battle sight is ranged for 530 yards, and consequently shoots high at all ranges within this distance. Hence, with this sight, aim about 1 foot below the object at 300 and 400 yards, and 2 feet below at 200 yards; otherwise the shot will be high.

In firing at living targets except at very short ranges, *aim should be taken at the bottom of the target.* Thus, in aiming at a man at long range, at least half of the body of the man (if standing) should be seen resting on the front sight or all if he is prone.

In firing at moving targets it will be necessary to lead the target in order to make a hit; otherwise the shot will fall behind.

The following table shows the approximate distance necessary to aim ahead of the body of a man or horse moving across the range at various distances and various rates of speed:

Distance (yards)	Man walking	Man double-timing	Horse walking	Horse trotting	Horse running
100	Front edge	0.5 foot	Front edge of body.	Front edge of body.	Front edge of body.
200	0.7 foot	1.7 feet	do	1.3 feet	1.3 feet
300	1.5 feet	3 feet	do	1.5 feet	3.8 feet
400	2 feet	4.4 feet	do	3.3 feet	6.5 feet
500	3 feet	6 feet	1 foot	5.3 feet	9.5 feet
600	4 feet	7.5 feet	2 feet	7.5 feet	13 feet

If the sights are *bright,* there will be a glimmer about them which interferes with accurate aiming. They should be a dead black. The sights are blackened by smoking them. A candle is the best thing to use; a match will do. Oiled rags which have been used to clean rifles make excellent smoke for blackening sights. Blacken both the front and rear sights. The black will not adhere to greasy metal.

Sight setting.—The marks opposite the peep indicate where the sight is to be set. The numbers on the sight leaf refer to the *marks below the numbers;* for example, the figure 6 is *above* the 600-yard mark. Changes in elevation of 25, 50, and 75 yards are necessary and, when there are no marks for these settings, they must be estimated with great care. A slight inaccuracy makes a big difference in the point of hit.

The marks on the wind gage are called points and changes in windage of quarter points may have to be made.

The bullet is carried *in the same direction that the sights are moved;* for example, if shots strike above and to the right of the bull's-eye, the elevation should be lowered and the windage set to the left. Winds carry the bullet to the right or left with the wind; therefore the windage is set to windward.

The elevation is not always set at exactly the actual range at which the firing takes place. With some rifles the elevation is set above the range, with others below it, and all rifles are not exactly true for windage.

Sight setting must be practiced. Reading about it will not make you a good sight setter.

Holding the rifle.—*The gun sling* is of great assistance in shooting. It helps to steady the rifle, presses the butt of the rifle against the shoulder with the same amount of force for each shot, and reduces the recoil.

There are two authorized methods of adjusting the sling, (1) the *loop* adjustment and (2) the *hasty sling* adjustment. The hasty sling is more rapidly adjusted than the loop sling, but it gives less support in positions other than the standing position. In range firing, the loop sling is used at all ranges except in the standing position at 200 yards. The hasty sling will be used on the range in the standing position at 200 yards. All men will be required to use one or the other form of gun-sling adjustments when firing or simulating fire in all problems and maneuvers.

(1) *Loop adjustment.*—(*a*) Loosen lower loop.

(*b*) Put left arm through upper loop from right to left so that the upper loop is near the shoulder and well above the biceps muscle.

(*c*) Pull leather keeper down so that it will hold the upper loop in place.

(*d*) Move the left hand over the top of the gun sling and grasp the rifle near the lower band swivel so as to cause the sling to be smooth along the hand and wrist.

(*e*) Lower loop, not used in this adjustment, will be loose enough to prevent any pull upon it.

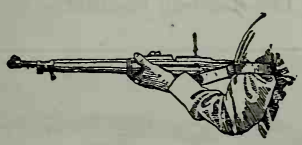


FIG. 42-6—Loop adjustment of sling.

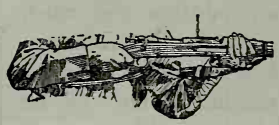


FIG. 42-7—Hasty sling adjustment.

(2) *Hasty sling adjustment.*—(*a*) Loosen the lower loop.

(*b*) Grasp the rifle just at the rear of the lower band swivel with the left hand and grasp the small of the stock with the right hand.

(*c*) Throw the sling to the left and catch it above the elbow and high on the arm.

(*d*) Remove the left hand from the rifle, pass the left hand under the sling, then over the sling, and regrasp the rifle with the left hand so as to cause the sling to be along the hand and wrist.

The sling may be given one-half turn to the left and then adjusted.

This twisting causes the sling to be smooth along the hand and wrist.

The standing position.—According to the latest practice, the firer stands half-faced to the right; feet from 1 foot to 2 feet apart; body erect and well balanced; left elbow well under the rifle; left hand grasping the rifle in front of the balance, rifle resting on the palm of the left hand; butt high up on the shoulder and firmly held, right elbow approximately at the height of the shoulder; cheek pressed against the stock and placed as far forward as possible without strain. A position with the left hand against or under the trigger guard and with the left arm supported against the body is not a practical field position and is prohibited in national matches.

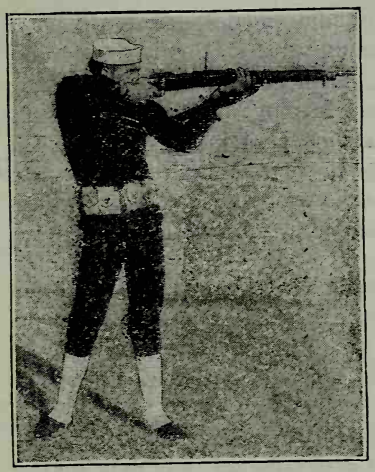


FIG. 42-8—Approved standing position.

There are, however, various ways of holding in the standing position. The left hand may be drawn back from the lower band swivel to near the trigger guard with the left arm resting against the body. The standing position is the most unsteady position and much practice with the rifle unloaded is necessary to cultivate steadiness. Do not be afraid in this position to press the jaw hard against the stock. The head then goes back with the recoil and the face is not hurt. Do not try to meet or resist the recoil. Let the body yield to it.

FIG. 42-9—Squatting position.

Some men may find they can hold the rifle more steady in the standing position, especially at rapid fire, by throwing practically the entire weight of the body on the left leg, keeping the left knee straight and throwing the

left hip out in the direction of the line of fire. The right knee is slightly bent, the right leg merely serving to steady the body. With the body in this position better support is afforded the left elbow and arm; which should be held close. The right elbow should be held level with the line of sight. Instead of using the loop of the sling around the arm as in all other positions the hasty sling should be used.

The squatting position.—Both feet are flat on the ground and the buttocks clear of the ground. Bend the knees and lower the body, resting both elbows on the knees, the points of the elbows over the knees. This position is comfortable, steady, and quickly taken (see Fig. 42-9).

The kneeling position.—The right knee points directly to the right, *i.e.*, along the firing line. The point of the left elbow is over the left knee. There is a flat place under the elbow which fits the flat place on the knee and makes a solid rest. Lean the body well forward. After practice the position ceases to be uncomfortable (see Figs. 42-10 and 42-11).

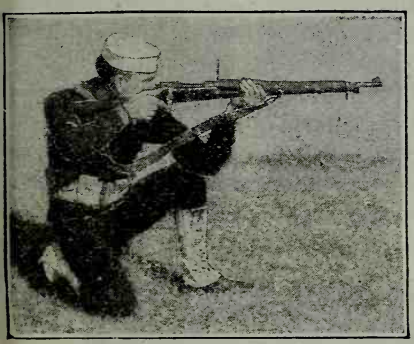


FIG. 42-10—Kneeling position.

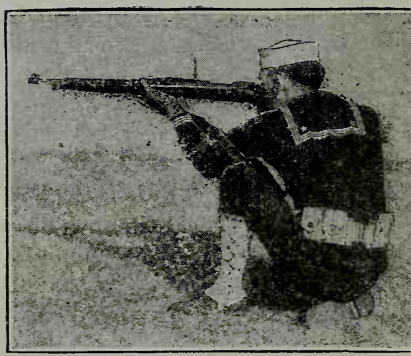


FIG. 42-11—Kneeling position. Sitting on side of right foot.

The sitting position is useful in outpost service. There are several varieties of the sitting position; every man must find the one which fits him best. Inexperienced men sometimes find difficulty in adjusting themselves to this postion, but with practice it becomes comfortable and steady. The legs must be at rest and the leg muscles not strained when aiming. Lean the body well forward and find a steady rest on the knees for both elbows (see Figs. 42-12 and 42-13).

The prone position.—Lie flat down at an angle of about 45 degrees to the firing line, spread the legs wide apart, and turn the heels inboard.

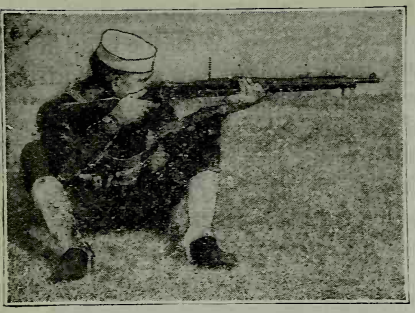


Fig. 42-12—Approved sitting position.

FIG. 42-13—Sitting position. Legs crossed.

Flatten the middle part of the body close to the ground. Place the point of the left elbow to the front and well to the right, then raise the right shoulder and, placing the right hand on the butt plate, put the butt of the rifle against the shoulder and flatten out again. Put the cheek or jaw hard against the small of the stock, the thumb of the right hand along and across the stock, and the right eye up to the firing pin, as close to the peep sight as possible. Let the right elbow spread out and, drawing the body back, get the chest and the whole body as flat on the ground as possible. The left elbow must be directly under the rifle. The right elbow is moved *out* to raise and *in* to lower the muzzle. Now the rifle cannot kick. The only recoil will be of the whole body, which will not be felt (see Figs. 42-14 and 42-15).

FIG. 42-14—Placing butt of rifle on shoulder.

Artificial rests aid in holding a rifle. In the standing position, a tree or post may be used. Shoot from the right of the post, resting either the rifle or the arm against the post. In firing from behind a parapet, any of the positions may be used, depending on the height of the parapet (see Figs. 42-16, 42-17, and 42-18).

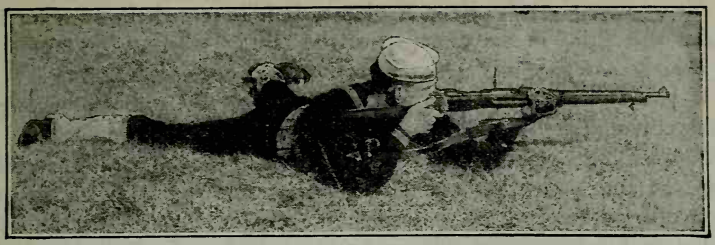


FIG. 42-15—Prone position.

FIG. 42-16—Using post.

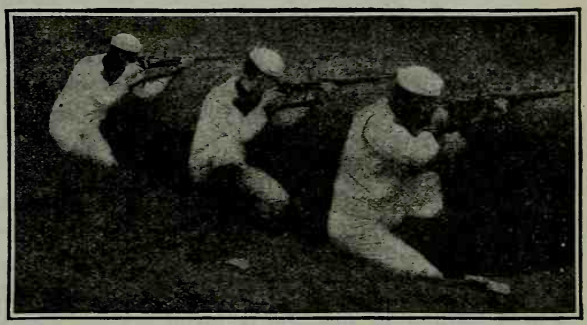


FIG. 42-17—Kneeling behind parapet.

FIG. 42-18—Sitting behind parapet.

General principles for firing in all positions.—*Press the cheek hard against the stock.*

Place the thumb along, and not across, the stock.

Never cant the rifle. Keep it plumb. If it is canted the least bit the bullet will strike in the direction of the cant.

Breathe out naturally and then do not breathe while aiming. If you aim too long, you will become unsteady and your eyesight will get bad. Take the rifle from the shoulder, rest, and aim again.

Squeeze the trigger. There is a little slack in the trigger. When aiming take this up with the finger so that when you wish to fire you have only to increase the pressure of the finger.

Before firing cock the rifle, and with the rifle *unloaded* squeeze the trigger. This will steady you down and get you better acquainted with your trigger pull.

Do not yank or pull the trigger: squeeze gently the whole small of the stock with the right hand. Let the trigger off as easily as you can, and keep up the aiming while the gun is being discharged, then you can tell where you are aiming when the bullet leaves the rifle.

Call the shot. As soon as you have squeezed the trigger and before the target is marked *call the shot, i.e.,* call out loud where you were aiming when the rifle was fired.

A man who intends to call the shot will not shut his eyes when he squeezes the trigger nor will he quit aiming while he is squeezing the trigger. He will not flinch. Calling the shot is the best cure for flinching. Make up your mind to continue aiming while the rifle is being fired. Calling the shot will help you.

In rapid fire keep the butt to the shoulder. To load, lower the muzzle to the right and work the bolt, being careful to draw it fully back so it will eject the empty shell and not cause a jam. It will become easy after practice.

To reload from the prone position, with the rifle resting on a parapet, raise the right elbow well above the ground without removing the butt from the shoulder.

THE PISTOL

The Colt, 45-caliber, automatic pistol is the United States Navy standard and will hereafter be referred to as the pistol.

To familiarize yourself thoroughly with the mechanism of the pistol, it should be dismounted and assembled in the presence of an instructor. This may be done without tools.

To dismount.—Remove the magazine by pressing the magazine catch. Press the plug inward and turn the barrel bushing to the right until the plug and the end of the recoil spring protrude from their seat, re-

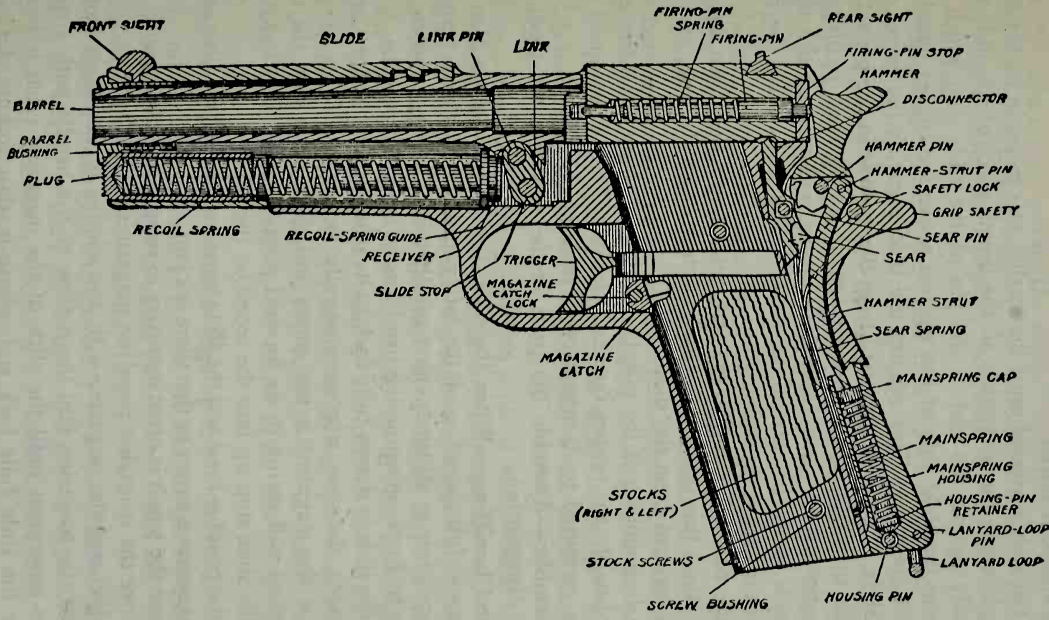


FIG. 12-19—Cross section of pistol.

leasing the tension of the spring. In carrying out this operation, the finger should be held over the plug to prevent it from jumping away; then it should be removed.

Draw the slide rearward until the smaller rear recess in its lower left edge stands above the projection on the thumb piece of the slide stop; press gently against the end of the pin of the slide stop which protrudes from the right side of the receiver above the trigger guard and remove the slide stop. This releases the link, allowing the barrel, with link and slide, to be drawn forward from the receiver in one piece. They carry with them the barrel bushing, recoil spring, and recoil-spring guide. Remove these parts from the slide by withdrawing the recoil-spring guide from the rear of the recoil spring; then draw the recoil spring forward from the slide.

Turn the barrel bushing to the left until it may be drawn forward from the slide; this releases the barrel, which, with the link, may also be drawn forward from the slide.

Partial dismounting of the pistol, as indicated above, is all that is required ordinarily for proper care and cleaning. Only experienced men should be permitted to dismount other parts of the pistol.

To assemble.—Assemble the parts in the reverse order from that given for dismounting.

Care and handling.—When the slide is in its forward position and the hammer is full cocked, push the safety lock up to lock the hammer.

The grip safety at all times automatically locks the trigger unless it is pressed in by firmly grasping the handle as in the firing position.

When the slide is drawn fully back to its rear position, and the magazine is empty, the slide stop automatically locks the slide in its open position; if the magazine is not empty and there is no jam, the slide when released will spring to its forward position unless it is locked by pressing the slide stop up into the recess on the slide.

When the pistol is fired and the slide remains open, it indicates either that the magazine is empty or that there is a jam.

To relieve the jam it is often necessary to remove the magazine.

To remove the magazine press the magazine catch.

To load, charge the magazine with any number of cartridges from 1 to 7; insert the magazine into the hollow of the handle with a quick continuous movement until the click of the magazine catch is heard; then draw the slide fully back and release it, thus cocking the pistol and bringing the first cartridge into the chamber. The pistol is now ready for firing.

With the magazine empty, the pistol can be used as a single loader by drawing back the slide, inserting a cartridge in the chamber, and pressing down the slide stop to release the slide.

After the pistol is single loaded (and locked as a safety precaution), a filled magazine may be inserted; the pistol then carries 8 cartridges ready for use.

It is dangerous to carry the pistol thus loaded and, except in emergencies, *the pistol should be carried with the chamber empty,* unless otherwise directed by proper authority. When cartridges are in the magazine, to cock the pistol, to load the chamber, and to prepare for firing, it is only necessary to draw the slide fully to the rear and release it.

Pressure must be entirely released from the trigger after each shot in order that the trigger may re-engage the sear.

To inspect the pistol to see that it is unloaded or to unload it, keep drawing the slide to the rear and releasing it until it automatically remains in the open position, first making sure that it is not pointed in such a direction that an accidental shot would cause damage. If the pistol is loaded, each time the slide is drawn to the rear a cartridge will be ejected.

Notes on pistol shooting.—When a pistol is first taken in hand, it should be examined to make sure that it is not loaded.

Both the front sight and the rear-sight groove should be blackened. When the pistol is aimed, the front sight should be seen through the middle of the rear-sight groove and the top of the front sight should be flush with the top of the groove. The part of the target at which to aim must be determined by practice. With most pistols at 25 yards the aim is usually taken at the bottom edge or in the bottom part of the bull's-eye, and at 50 yards in the center or in the upper part of the bull's-eye.

Grasp the stock of the pistol as high up as you can so that the barrel, hand, and arm are as nearly as possible in one straight line. The thumb should be extended along the upper part of the frame. The second joint of the forefinger should be on the trigger.

Start with a light grip and gradually squeeze with the whole hand, causing the trigger to yield gradually as the grip is tightened, and continue squeezing without a jerk until the pistol fires. Decide to call the shot and to keep the right eye open.

If the hits are bunched to one side, they can be moved to the right by increasing the pressure of the thumb against the left side of the

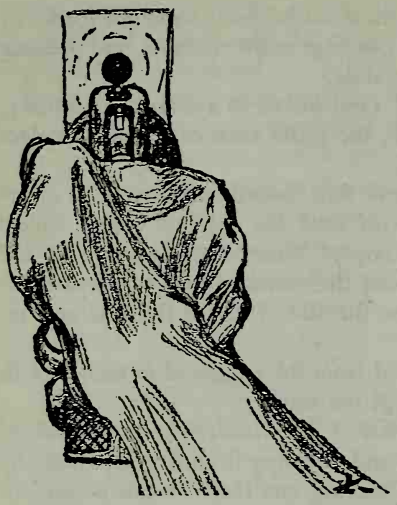


FIG. 42-20—Aiming at the bottom edge of the bull's eye. The point aimed at varies with the pistol and with the range.

pistol or to the left by decreasing the pressure.

Snapping, i.e., aiming and squeezing the trigger with the pistol not loaded, is most valuable practice. No man should load and fire until he has snapped several times to get acquainted with the trigger pull of the pistol. Expert pistol shots do a great deal of snapping instead of a great deal of firing. Steady holdings can be acquired only by much snapping practice.

Positions. — In the prone position, the right elbow has excellent support on the ground. In the kneeling position, the firer may kneel on either knee. If kneeling on the left knee, the right knee affords an excellent rest for the elbow. In the squatting position, both elbows rest on the knees. In the standing position, face the target squarely, or nearly so; stand upright, not craning the head forward, and extend the arm to its full length.

THE OBJECT OF SIGHTING, POSITION, AND AIMING DRILLS AND OF GALLERY PRACTICE; GENERAL PRINCIPLES OF INDIVIDUAL RANGE FIRING

Anyone who is physically fit for duty can learn to use a rifle and pistol effectively. He must, however, be carefully instructed from the start, as otherwise he instinctively does the wrong thing. After learning the mechanism of the rifle and pistol, he is taught the various positions and how to aim properly in each position. He is then shown how to *squeeze* the trigger. The Hollifield dotter is found aboard all ships and is an excellent means of developing skill in taking position, aiming, and squeezing the trigger. After men have learned how to take the various positions, how to aim properly in each position, and how to squeeze the trigger, they are sent to the range where they actually fire on targets,

FIG. 42-21—To open the chamber.

FIG. 42-22—To load the pistol.

FIG. 42-23—To raise the pistol.

FIG. 42-24—To withdraw the magazine.

FIG. 42-25—To inspect the pistol.

FIG. 42-26—Standing position.

under the supervision of an instructor. When they learn how to fire correctly, they are given an opportunity to fire the record practice to qualify as expert, sharpshooter or marksman. Extra compensation is paid to those men who qualify as expert riflemen or sharpshooters in this record practice.

SAFETY PRECAUTIONS

Never point a rifle or pistol at anyone you do not intend to shoot nor in a direction where accidental discharge may do harm.

On leaving the firing line, *open the chamber and keep it open.*

Never leave a loaded rifle, or one with cartridges in the magazine, or a loaded pistol where it can be picked up by others.

Immediately upon taking up a rifle or pistol *make sure by personal examination that it is not loaded.*

On the firing line, if the rifle or pistol is *loaded, keep it locked until you are ready to shoot,* and do not turn around on the line with a loaded rifle or pistol in your hand.

Never carry the pistol in the holster with the *hammer cocked* and *safety lock on,* except in an emergency, or unless directed by proper authority.

Never put your trigger finger within the trigger guard until you intend to fire and the gun is pointed toward the target.

CHAPTER 43

ELEMENTARY GUNNERY

Gunnery training 511
Guns 515
Primers 521
Fuzes 522
Powder 523
Projectiles 524
Summary 526
Magazines and shell rooms 526
Safety precautions for all hands 527

GUNNERY TRAINING

Gunnery is the term used to describe the science of using guns, torpedoes, and other ordnance material to the best advantage.

Gunnery training is held for the purpose of developing the efficiency of the gun and fire-control crews for battle. Members of both gun and fire-control crews are first carefully selected for each particular duty and are then carefully instructed in their duties. This being done, they are given a general training in the duties of the other members of their crew, so that they may know what is expected of each one. The whole crew is then trained together so as to develop good teamwork for the whole ship's battery. Training has been entirely successful when each gun can get the maximum number of *hits per gun per minute.*

The speed necessary to obtain the maximum *hits per gun per minute depends on the rapidity of loading, of sight setting, and of pointing and training. Accuracy is most essential.* Only the shots that hit count.

Rapidity of loading is obtained only when members of the gun crew know, in general, the duties of other members of the crew and know their own particular duties in every detail. Each man of the crew must do his particular duty at the right time, with great accuracy, and with speed. The desired speed in setting of sights has been obtained when the sight setter can set his sights *exactly* in the minimum of time. He must be trained to catch all ranges and deflections accurately over the voice tubes and telephones, and must be able to put these on the sights exactly as received and with no loss of time.

The maximum in rapidity of pointing and training has been obtained

when both the pointer and trainer are able to be steady on the target at each sounding of the firing signal.

Object of target practice and rewards for accurate shooting.—Target practices are held every year to test out all ordnance material, to give the men practical training in the actual firing of the guns, to give pointers and gun captains an opportunity to qualify for their positions, and to determine the ship's efficiency as a whole for engaging in battle. A short-range practice is usually held every year for qualifying pointers and gun captains and testing out ordnance material. A long-range battle practice is held to determine the ship's efficiency for battle. A night battle practice is held to exercise the crews for night action. Anti-aircraft, torpedo, and special practices are held to drill crews in action against aircraft, to drill torpedo crews with their torpedoes, and for special problems. Every practice is made to simulate as closely as possible the conditions which would exist in actual battle.

Cash prizes are awarded gun crews (including handling-room crews) which make a certain prescribed standard score at short-range practice, and to fire-control, ship's control, depth-charge, torpedo, and anti-aircraft control parties and crews who show special merit on prescribed practices. First class prize is $10 per man and second class prize $5 per man. In addition to these prizes, crews which make the prescribed high score in short-range practice, torpedo practices, etc., are given authority to wear the "Navy E" until the practice is fired again, or for one year, providing a qualifying practice is not scheduled for the following year. Various special cups are given to ships obtaining the highest merit in certain prescribed practices, and to the group of pointers who get the year's high score. All men who engage in any gunnery work have records of their performance kept in the ship's gunnery department. When a man qualifies for a particular station, a record of his performance becomes an important part of his service record.

Method of gun laying.—Most of the guns at the present time have telescopic sights. In a telescopic sight there are two cross wires, a horizontal one and a vertical one, which move as the gun is pointed or trained. In Fig. 43-1, *AC* represents the horizontal wire and *BD* the vertical wire.

The aiming of the gun is accomplished by two men, a pointer and a trainer. The pointer moves the gun in elevation, *i.e.*, he raises it and lowers it. The trainer moves the gun right and left. The pointer's duty then is to keep the horizontal wire *AC* on the center of the target or the point designated as the point of aim. The trainer does the same with

the vertical wire. The pointer does the firing. He should fire when the intersection of the cross wires is steady on the point of aim. This system of firing is known as pointer fire.

Some pointers, especially when firing for the first time, get so excited that they are afraid the telescope will hurt them and do not aim accurately; or, if they do, they jump away from the eyepiece or even away from the gun, thus failing to keep the gun pointed during the firing interval, losing valuable time and spoiling the score. A pointer who cannot overcome this nervousness cannot be retained on the station. Men whose nerve and physical training will withstand the exhaustive tests incident to battle are those to be desired. A man's rating, general knowledge, or executive ability is not allowed to have weight in his selection as a gun pointer.

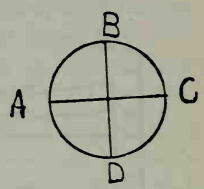


FIG. 43-1—Cross wires of telescopic sights.

Qualified pointers receive extra pay, depending on their qualification. A heavy-gun pointer, first class, gets $5 per month additional pay. In director fire, the two pointers on a special instrument are kept matched and the sights are not used. Matching these pointers properly is just as important as getting the cross wires on in pointer fire.

Terms used in gunnery.—*The arc of fire* is the horizontal angle through which a gun, as mounted on board ship, can be trained and fired. In torpedo defense, the guns are assigned to groups which have the same arc of fire so that each group protects a certain quarter of the ship.

Bore-sighting consists of lining up the sights with the center of the bore of the gun so that lines projected from each will intersect at the target. A bore-sight telescope is installed in the breech of the gun for doing this, and each gun must be bore-sighted before each firing, and at the firing range. Once a gun has been bore-sighted, the sights should only be touched as necessary at ordered drills, and then with care.

The danger space is the distance a target, which has been struck at the extreme base, can be moved toward the gun from the point of fall of a projectile, and still be in such a position that the shot would have scored a hit at the extreme top. The higher the target the greater the danger space. If the target is anywhere within the danger space, it will be hit. High-powered guns have a greater danger space than low-powered guns, because their trajectory is flatter.

The flight of a baseball may be used to illustrate this, as follows: In the case where a baseball is thrown from the catcher to second base,

it travels at practically the same distance from the ground all the way. A man would be struck if he were standing anywhere on the line between home plate and second base. In the case of a high fly, it is only necessary for a person to move up a short distance to allow the ball to pass over his head, even though it may have been aimed for his feet. The

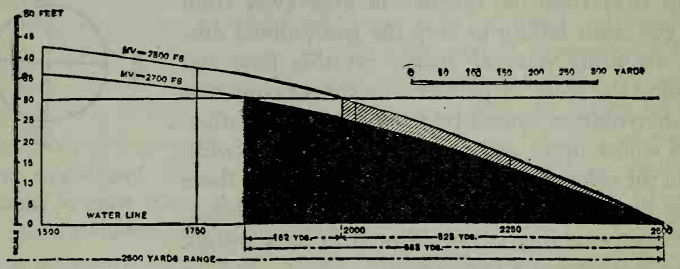


FIG. 43-2—Danger space increased from 523 yards to 586 yards by increasing velocity from 2,500 to 2,700 feet per second.

distance he has to move is the danger space, and, obviously, the taller he is the farther forward he has to move.

The gun-pointer group consists of the pointer, trainer, and sight setter.

The loading crew consists of the gun captain (who may also be the plugman), plugman, rammer-man, shellmen, and powdermen.

The plotting-room is the point from which all information which has to do with control of the firing is sent out to main battery guns, as range, deflection, etc.

"Silence" is an order given in a turret when it is desired that all operations cease, and is usually given in case of a major casualty or other emergency.

The spotter is the person who estimates the distance shots fall beyond or short, and to the right or left of a target. His estimates are transmitted to the plotting-room to be applied to the range and deflection to be sent to the guns. Planes are now being used as stations for spotters; their estimates are transmitted to the ship by radio.

A talker is one who mans a telephone or voice tube and transmits messages. He should repeat each message exactly (word for word) as received.

GUNS

Construction of guns.—Tremendous pressure is necessary to give projectiles the desirable high muzzle velocities; guns must be built to withstand this pressure, which in high-powered guns is not less than 18 tons per square inch.

Because of its strength and toughness, forged, nickel, or vanadium steel is used in the manufacture of guns for the United States Navy. For additional strength, guns larger than 6-inch are built up, *i.e.*, they are made in several layers.

Building in layers allows both the inside and outside of the gun to be subjected to the same pressure, whereas a single, thick tube might be cracked on the inside before the outside felt the pressure. Also, it is easier to locate flaws in a thin tube than in a thick one. A system has been developed whereby the steel of monoblock (one-piece) guns can be made to take equal pressure throughout but the danger of flaws has confined the manufacture of one-piece guns to 6-inch or smaller.

A built-up gun consists of a liner, a tube, and successive hoops. The liner is the inner layer and runs the full length of the gun; the tube is the next layer and also runs the full length of the gun; each of the succeeding layers consists of three hoops, called B1, B2, and B3 hoops, C1, C2, C3, and D1, D2, D3. Each pair of hoops in each layer is secured together by a narrow hoop, built in two parts and called a locking ring. Each layer of a gun is made to fit very tightly over the one inside it, by heating the outer layer and then cooling it so that it will shrink onto the part over which it has been placed. Careful inspections and measurements are made throughout the process of manufacture and assembly.

When the layers have been shrunk together, rifling is cut into the liner. Rifling consists of spiral grooves which give the projectile its whirling motion; this prevents the shell from "tumbling," and thus increases the range and causes the projectile's flight to be truer. The raised parts of the rifling are called the *lands* and the depressions the *grooves*.

When a gun is fired, copper from the rotating bands on the projectiles frequently sticks to the rifling; this must be removed by *lapping out,* pulling emery covered blocks through the gun.

After a gun has been rifled, it is smoothed off, shaped, inspected, and is sent to the Proving Ground to be proof fired. The proving, including the firing of one shot with an overcharge of powder, having been successful, the gun is ready for issue to the service, after it has been inspected.

Size.—The caliber of a gun is its inside diameter, measured from the

tops of the lands. In the United States Navy the size of a gun is given by stating its caliber in inches and its length in calibers, as 14-inch, 50-caliber, which would be a gun 700 inches long with a bore 14 inches in diameter. The size of some smaller guns is designated by the weight in pounds of the projectile, as 1-, 2-, and 3-pounders.

Classes of guns.—Guns are classed by *calibers* and by *batteries*. They are divided by calibers into *major-caliber, intermediate-caliber,* and *minor-caliber* guns. Major-caliber guns are 8-inch and above; intermediate caliber are 5-inch, 6-inch, and 7-inch guns; minor caliber are 4-inch and smaller sizes, except "small arms."

A ship's guns belong to the *main, secondary,* or *anti-aircraft* battery. On ship's having turrets, the main battery consists of the turret group; on smaller ships the main battery includes all guns not designated as anti-aircraft guns or assigned special duties. The secondary battery on major ships includes non-turret guns which are not installed for a special duty, as for aircraft defense, depth-charge projection, etc. The secondary-battery guns are frequently called *broadside* guns. The anti-aircraft battery includes those guns whose primary duty is to defend the ship from aircraft attack.

Definition of types of guns.—*Breech-loading rifle.*—Any rifled gun which loads from the breech. All modern naval guns load from the breech, are rifled, and are more or less rapid-firing; consequently, this term and that of *rapid-fire guns* have practically been abandoned.

Bag guns.—Guns whose powder is not in metallic cases. The projectiles and powder are put in separately, the powder being in bags.

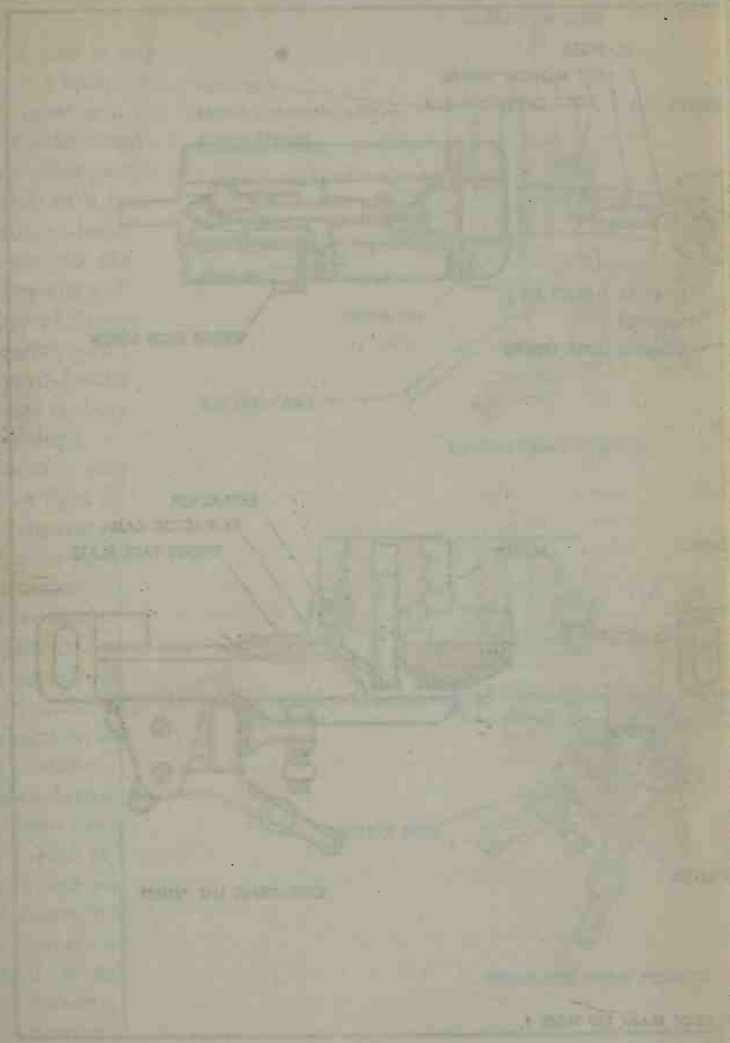
Case guns have powder in metallic cases. The projectiles and powder are combined into a cartridge.

Automatic guns utilize the recoil to eject the case and reload the gun. After the gun has once been loaded, it is only necessary to pull the trigger to continue fire. The only automatic guns now in use in the United States Navy belong to the machine-gun or "small arms" types.

Semi-automatic guns are those whose recoil ejects the cartridge case and leaves the breech in such a condition that it will close automatically when a cartridge is properly inserted.

Machine guns.—A gun of small-arm caliber from which a continuous rapid fire can be maintained by operating its mechanism either by hand or by motor power, causing successively loading, firing, and extraction of the empty shell.

Field guns.—Light guns, usually of 3-inch caliber or less, mounted on field carriages for operations on shore. When of rapid-fire-gun type and specially designated as *field,* they are usually shorter, lighter in



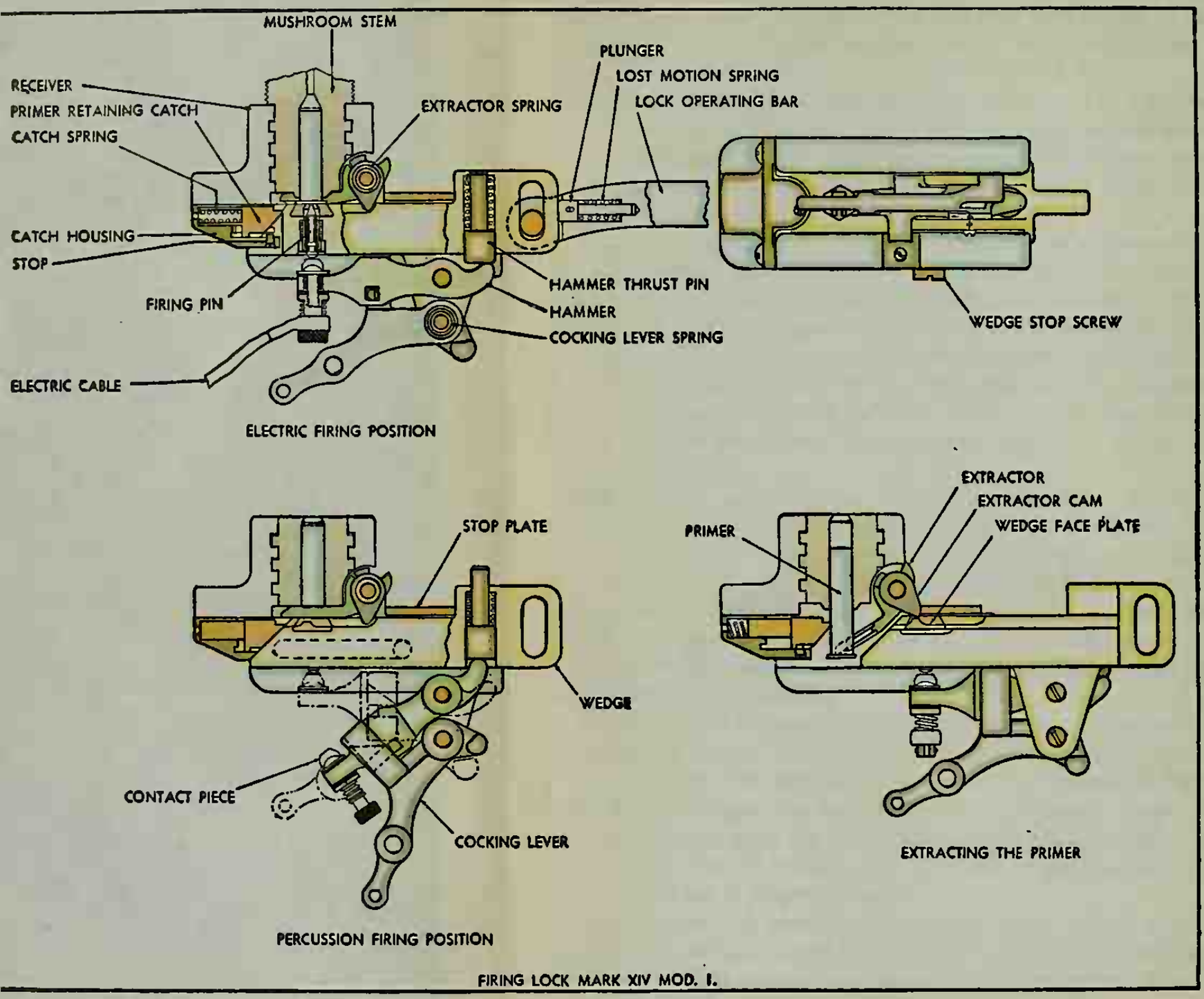


FIG. 43-3. FIRING LOCK DETAIL

weight, and have less power than ship's guns of the same caliber. Sometimes they are combined field and boat guns, having a special mount for boat use.

A boat gun is one supplied with a mount which permits its being secured in a boat.

Small arms is a collective term which includes rifles which may be fired from the shoulder and pistols which may be fired from the hand.

A subcaliber gun is one which is mounted either inside the bore or on the outside of a larger gun for use at drill. Subcaliber guns may either use blanks to indicate the simulated firing of the larger gun or may be used with ball cartridges in firing at an actual small-scale target for drill; they are usually 1-pounders or rifles and are fired by pressing the firing key of the gun to which they are attached.

A saluting gun is one which is normally used for firing salutes or as a signal gun. Saluting guns fire blanks and are usually one of the class whose size is designated by the weight of the projectile, as a 3-pounder on large ships.

A line-throwing gun is a short-barreled, rifle-like gun which is used to shoot a light line across a space which is too great to permit the passing of a heaving line.

Parts of a gun.—An assembled firing unit consists of the gun proper and the mount. The gun proper carries the breech mechanism, with firing lock, salvo latch, and gas-expelling device; the mount carries the recoil brakes, the counter-recoil system, and the sights.

The outside of a gun is divided into the breech, rear cylinder, slide cylinder, chase, and muzzle. The inside of a gun is divided into the bore, chamber, and screw box liner.

The mount of a no-turret gun consists of the stand, carriage, and slide.

Nomenclature of parts of a gun.—*The bore* is the opening inside a gun, from the after part of the rifling to the muzzle.

The breech is the rear end of the gun.

The breech mechanism is the mechanical device for closing the rear end of a breech-loading gun.

The carriage is that part of the mount which supports the slide. It is supported by the stand and to it are secured the trunnion seats. On pedestal mounts, the carriage carries the training and elevating gear.

The chamber is the enlarged rear part of the inside of a gun; it is not rifled and is the part which holds the powder in bag guns and the cartridge case in case guns.

The chase is that sloping part of the outside of a gun between the muzzle and the slide.

The firing lock is attached to the rear end of the mushroom stem and fitted with a mechanism to eject primers, firing pin for percussion firing, and connections for firing the primer by electricity. One type of firing lock is now supplied for all guns in the Navy using separate ammunition.

Gas-check pad and mushroom.—Two systems of preventing gas leakage are in use. (1) The one used with small arms and case shells employs the cartridge case which is of soft metal and is a neat fit in the cartridge chamber. When the shell is fired, the pressure of the gases expands the walls of the cartridge case against the sides of the chamber, making a gas-tight fit. (2) The second system uses a mushroom head, split rings, and gas-check pad. These parts together form a projection on the end of the plug and fit neatly in a very smooth part of the bore, called the gas-check seat. When the gun is fired, the pressure of the gases on the mushroom head forces it back against the split ring and the gas-check pad, which squeeze out against the gas-check seat and form a gas-tight joint at this place. This system is used with bag guns.

The gas-check pad is made of compressed asbestos and tallow sewed in canvas. It is placed between the mushroom head and the plug with

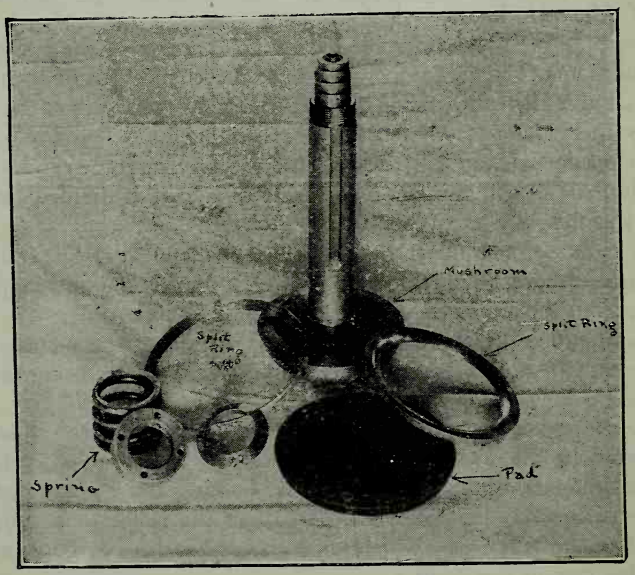


FIG. 43-4—Mushroom, rings, pad, spring, and nut.

front and rear split rings and a small centering ring. The pad and the front and rear split rings rest in the gas-check seat of the liner.

The mushroom receives its name from its shape (see Fig. 43-4). The mushroom must be sponged off after each shot.

The gas-expelling device is a mechanism which automatically admits compressed air into the chamber of a gun with the first motion of opening the breech. It speeds up the removal of gas from the bore of the gun. The air must be shut off by hand, but not until the bore has been looked into and found to be clear.

A hangfire is a shot which fails to go off on the first attempt to fire, but goes off later.

A misfire is a shot which fails to fire.

The muzzle is the front end of a gun, from which the projectile is expelled.

The plug is a forged steel block fitted with stepped threads which fit into the threads of the screw-box liner.

The pressure of the gases which forces the projectile from the muzzle is just equal to the pressure which tends to force the breech block out of the breech; therefore, the breech block must be locked in place in the strongest possible manner.

Two types of breech blocks are used in modern large guns. The first is like a bolt with some of the threads filed away in segments around its circumference. The places where the threads are filed away are called blanks. Blanks of the same size are filed away from the inside of the breech of the gun; the threads on the plug swing inside the breech at the places where there are blanks, and then the plug is locked by revolving it so that the threads in the gun and the threads in the plug are engaged. The object of having blanks in the gun and on the plug is to lock the plug securely with a small amount of rotation; if there are two blanks and two equal-threaded segments the plug may be locked by turning it one-quarter of a turn. Perhaps there will be 10 threads engaged in each segment, and it would have taken 10 complete revolutions of the plug to screw it home if there had been no blanks. The second type, a modification of this system, has been made by using what is called a stepped plug in which threads are used; a step can then slide into the gun over a lower one which is cut in the gun, and only about one-sixth of a revolution is necessary to lock the plug with the threads. The threads of this type cover two-thirds of the circumference, while the first one described had threads only halfway around the circumference.

The above type of plugs are called the interrupted screw type, and these are in general use for guns above 3 inches in caliber.

A sliding-wedge plug is used for closing the breech of some guns, and there are both vertical sliding wedges and horizontal sliding wedges. The Hotchkiss and 3-inch semi-automatic guns use the vertical sliding wedge and the 3-inch, 23-caliber, anti-aircraft guns use the horizontal sliding wedge.

Another type of breech block is the sliding bolt, which is used with small arms. The bolt is pushed forward and a very strong arm sticking out at right angles to the bolt is turned down into a groove in the breech forging.

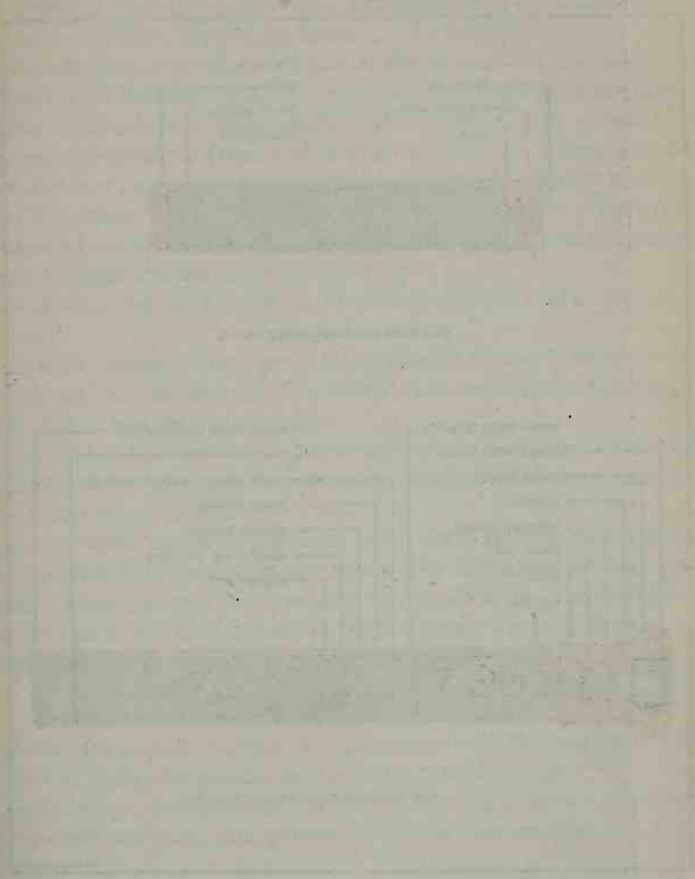
The rear cylinder is that part of a gun which is over the chamber. It is at the breech of the gun, and is the part in which the metal is thickest.

Recoil system.—The movement of a gun to the rear, which is caused by the backward pressure of an exploding powder charge, is known as the recoil. If this recoil were not checked, the gun would move backward too far, and if an attempt were made to hold a large gun in a fixed position, the strain on the mount would be too great; consequently, a recoil system has been developed.

Most recoil systems are hydraulic and consist of a plunger working in a cylinder. The cylinder is filled with a glycerine mixture and is usually attached to the slide. The plunger moves in the cylinder and gradually increases the resistance to recoil by compressing the glycerine mixture, but systems are provided which permit the mixture to flow through or around the plunger, rapidly during the first part of the recoil and more slowly toward the finish, the openings which permit flow being gradually closed by a mechanical device. The piston is usually attached to the gun by the piston rod and gun yoke. Recoil cylinders must be filled before each firing. Friction in the slide and compression of counter-recoil springs assist in checking the gun when it recoils.

When a gun has reached the end of its recoil, it is not in a position to be fired again; therefore a counter-recoil system, which will return it to battery, has been developed. This usually consists of springs, contained in cylinders, except that on the largest guns a pneumatic counter-recoil system is provided to assist the springs. The springs are gradually compressed as the gun recoils. The compressed springs push the gun back into battery as soon as they can overcome the pressure of the recoil. At times guns fail to return to battery and must be returned by hand; it is not safe to fire them if they are not returned to the normal position.

The salvo latch is secured to the breech of a gun and attached to the



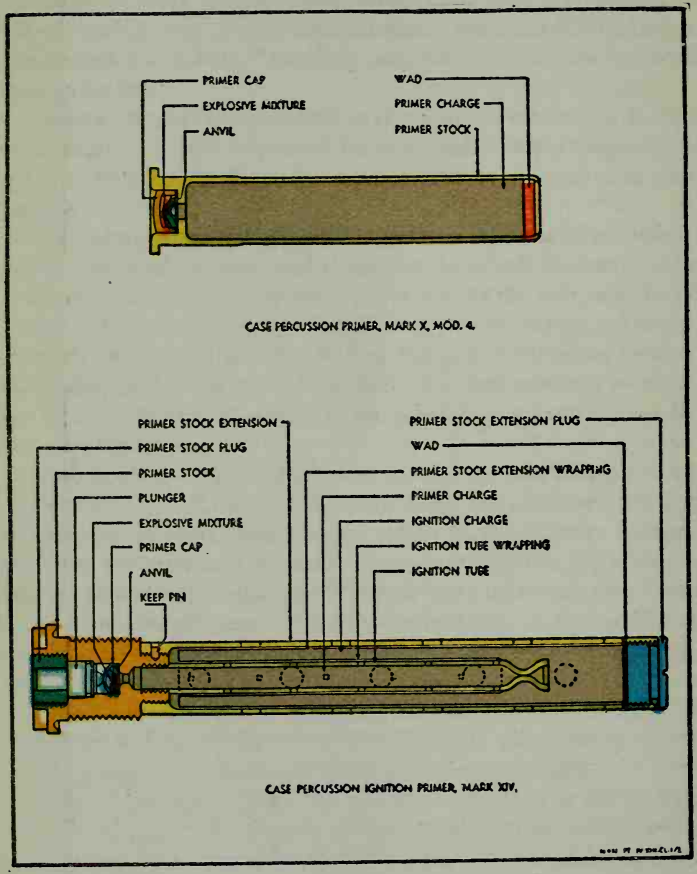


FIG. 43-6. PRIMER TYPES.

operating lever. It is installed to prevent a loaded gun from being opened, except with the full knowledge of the person opening it. The salvo latch is automatically released by the recoil, but a breech which has been closed cannot, under any other circumstances, be opened until the salvo latch has been tripped by hand.

The screw box is the threaded part at the breech of a gun into which the plug fits. In loading a gun, care must be taken not to burr the threads.

Sights are the devices which enable a gun to be properly aimed by eye. Most gun sights are telescopic and have some means of causing the pointer's and trainer's sights to remain parallel to each other. Sights must be in correct adjustment, properly focused, bore-sighted for the proper range, and handled with care. The sights of the particular gun which is assigned to your division should be carefully studied.

The slide is that sleeve part of the mount which directly supports the gun.

The slide cylinder is that part of the outside of a gun which rests in the slide and moves through it in recoil; it is made truly cylindrical so that it will fit snugly in the slide.

The stand is that part of a gun mount which is secured to the ship.

The tompion is a plug with which the muzzle should always be closed when a gun is not in use.

The trunnions are two cylindrical projections, one on each side of a gun. The gun is supported in the carriage by the trunnions and moves on them when elevated or depressed. Monoblock guns have the trunnions cast as a part of the gun; in built-up guns the trunnions are cast as a part of the slide.

PRIMERS

Primers are objects, similar in appearance to blank cartridges, which are used to ignite the powder in the firing charge of a gun.

Combination percussion and electric primers are used for all heavy and intermediate guns, and percussion primers are used in 3-inch guns and under.

The general features of a primer are: The primer stock is made of bronze; it is cylindrical in shape, the diameter of the base being about 0.6 inch and the length of the primer 2 inches. The primer is shown in Fig. 43-5.

The operation, when firing by percussion, is as follows: A plunger in the base of the primer ordinarily has its point just touching a Winchester primer cap containing fulminate of mercury. The primer firing

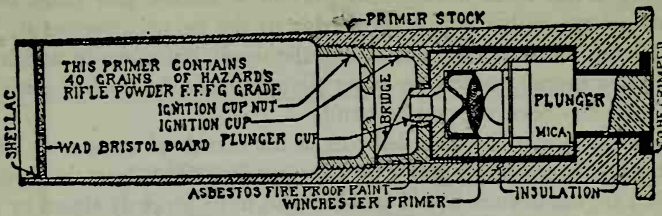


FIG. 43-5—Combination primer for separate ammunition.

charge, consisting of about 40 grains of rifle powder, is in the lower part of the primer stock. When the gun is fired by percussion, the firing pin strikes the base of the plunger and the plunger point, in turn, strikes the fulminate of mercury cap, which fires the primer charge and consequently ignites the firing charge in the gun.

To provide for electric firing, the plunger, plunger cup, and Winchester primer are separated from the primer case by an ebonite bushing. When the breech of the gun is closed, the firing pin makes contact with the base of the plunger. The current passes from the firing pin through the plunger, plunger cup, and a short platinum wire with a wisp of guncotton around it, called a bridge. One end of this platinum wire passes through a cavity filled with rifle powder, while the other end is secured to the primer stock. At the instant of closing the firing key the current passes through the plunger, heats the platinum wire, ignites the guncotton and powder, and then fires the primer. The primer just described is used on bag guns, and it is inserted in the firing lock by a member of the gun's crew. These primers are tested before firing.

Other types of primers differ only in detail. Combination primers for rapid-fire guns and all percussion primers are fixed in the base of metallic cartridge cases. In general, primers fixed in the cartridge cases are much longer than those used with separate ammunition. If you can firmly fix in your mind the details of the primer just explained and illustrated, you will have no difficulty in understanding the action of any primer.

FUZES

A fuze is used to explode the bursting charge of a projectile. Armor-piercing and common projectiles have the fuze located in the base of the shell. Shrapnel and illuminating projectiles have the fuze in the nose of the shell.

The action of the latest type of fuze is kept secret. As in the case of the primer, it is best to get the general principles on which a fuze operates

firmly fixed in your mind rather than confuse yourself with the details of the various types of fuzes. Consequently, in Fig. 43-7, a typical fuze for an intermediate-caliber projectile is illustrated. The stock, which is of brass, screws into the base of the projectile. The rotation of the projectile about its axis, given it by the rifling of the gun, causes the centrifugal locking bolt to fly out, allowing the fuze to "arm," *i.e.*, allowing the point of the firing plunger to fly forward and take a position directly

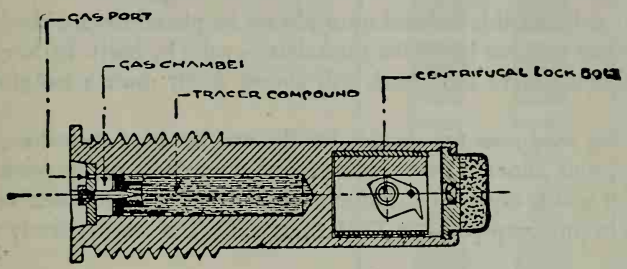


FIG. 43-7—Medium-caliber tracer fuze, Mark I.

behind the fulminate of mercury cap. When the projectile strikes, the plunger flies forward, explodes the cap which, in turn, ignites the black powder in the forward end of the fuze, and finally the bursting charge in the shell.

A tracer is sometimes installed to afford a means of following the shell in flight; the tracer compound is usually ignited by the action of the gases from the firing charge on a friction element, but some have percussion caps. A tracer burns for several seconds, and usually throughout the flight of the projectile.

The time fuze used in shrapnel and illuminating projectiles can be set to cause the explosion of the shell at a certain time after the gun is fired. The fuze can be set to expose varying lengths of a train of powder, and the time of exploding the shell can thus be varied. The powder train is ignited, at the exposed point, by the firing of the gun and, when the length of powder train has burned, the flame ignites the bursting charge.

POWDER

Except for saluting guns, smokeless powder is used in our Navy. It is in the form of amber-colored, cylindrical grains of varying sizes for different-sized guns. It is carefully stacked in silk bags, which are sewed

and then laced so that they will keep their proper size and shape. These bags are stowed in the magazines in air-tight metal tanks. Powder in fixed ammunition is contained in the metallic cartridge cases.

A charge for any gun is made up of one or more powder bags. A 5-inch gun uses 1 bag while a 16-inch uses 4.

At the base of each powder bag there is secured an ignition charge, composed of black powder, which is ignited by the primer, and, in turn, ignites the smokeless powder. The ignition-charge end of each bag is painted red, and this red end must always be placed toward the breech. The primer will not ignite the smokeless powder by itself. Failure to put the red end toward the breech will almost surely cause a hangfire or a misfire.

TNT is used now for charges for the war heads of torpedoes, depth charges, and mines. These are exploded on contact or by pressure by a primer which explodes a charge of granulated or more sensitive TNT which, in turn, explodes the TNT charge. TNT is comparatively safe to handle.

PROJECTILES

Types of projectiles.—Projectiles ordinarily used in the Navy are armor-piercing, common, target-practice, non-ricochet, shrapnel, and illuminating.

An armor-piercing shell is intended to penetrate armor. The armor it will penetrate depends on the caliber of the shell, but in all cases it may be depended upon to penetrate considerably deeper than the common shell of equal caliber. It is cylindrical, with a solid, pointed, ogival-shaped head. A soft-steel, cylindrical cap, frequently called a wind-shield, is fitted on the point of the armor-piercing shell. When the shell strikes armor the first shock of impact bends the hard plate in, while the projectile pierces its cap; the hard point of the shell then strikes the hard surface of armor, when the latter is bent in nearly to its breaking point and the shell enters easily.

Common shell is the same as the armor-piercing, except that it is not fitted with the soft steel cap and the metal of the shell is thinner, thus allowing a larger space and bursting charge. Its bursting charge is usually black powder, where that of the armor-piercing shell is "Explosive D."

Target-practice shells are of the same weight, size, and shape as the common shell, but are made of much cheaper materials. Instead of a bursting charge, they are filled with sand or other heavy material to bring the shell to proper weight.

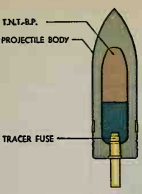


FIG. 1. COMMON.

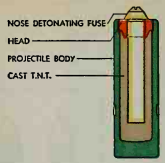


FIG. 2. FLAT NOSE.

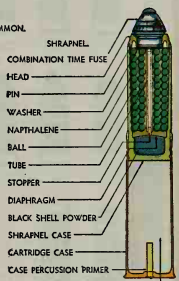


FIG. 3. SERVICE.

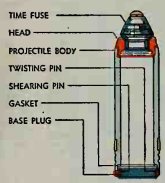


FIG. 4. ILLUMINATING.

FIG. 5. TARGET.

AMMUNITION ASSEMBLED WITHOUT DISTANCE PIECES OR WADS, AND TO BE THOROUGHLY CRIMPED BEFORE ISSUE.

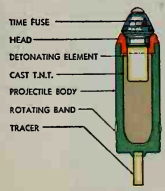


FIG. 6. CLASS B. ANTI-AIR CRAFT.

FIG. 43-B. TYPES OF PROJECTILES

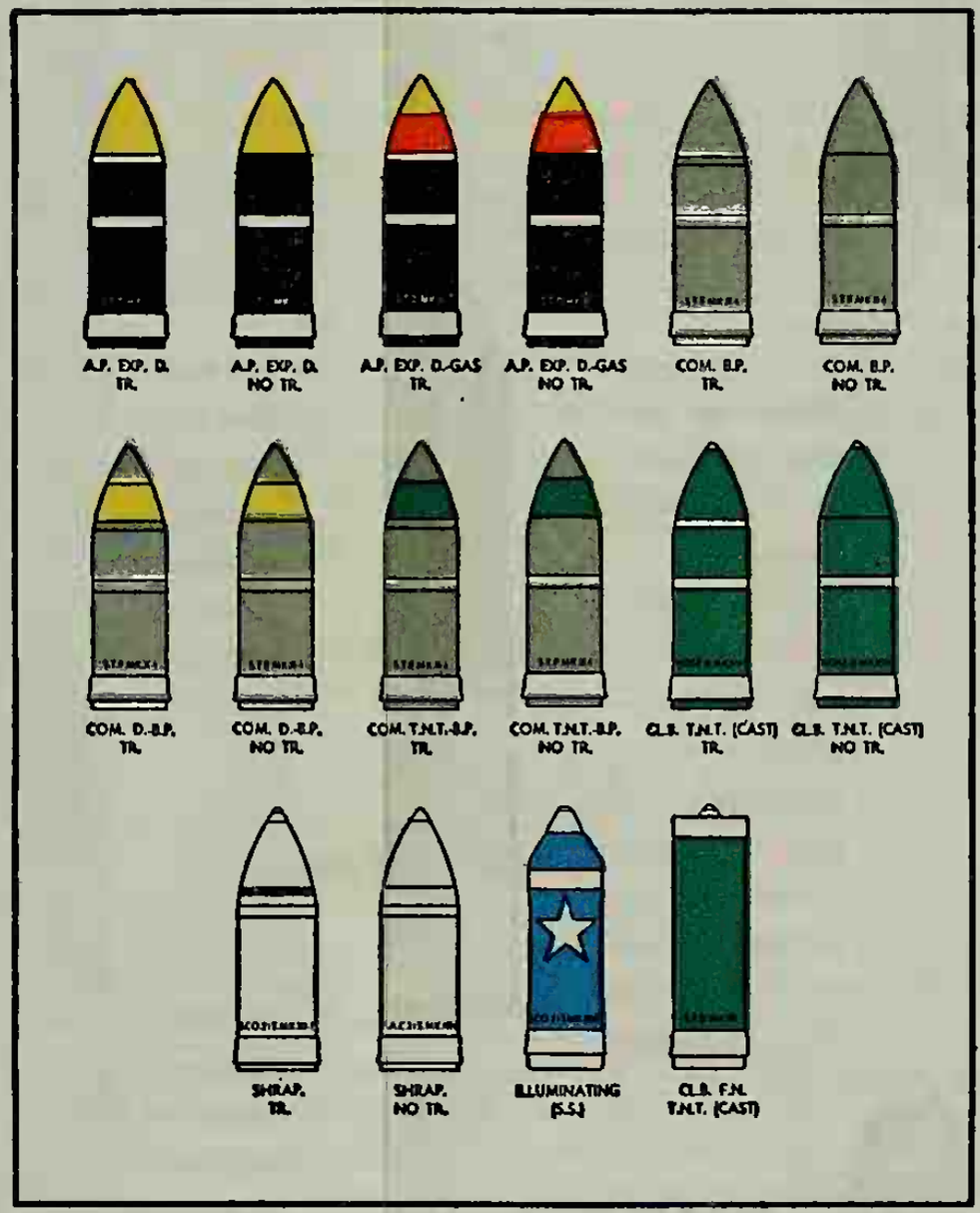


FIG. 43-9. MARKING OF SHELLS

Non-ricochet is a flat-nosed projectile with a large bursting charge; it is for use against submarines.

A shrapnel is cylindrical in shape, with a round hemispherical head. It is made of cast steel, has a small bursting charge and thin walls, the cavity of the shell being filled with a large number of small balls (from 200 to 400), about 0.5 inch in diameter, packed in rosin or sulphur.

It is used mainly to kill personnel, against exposed bodies of men ashore or on deck, or against aircraft. The shrapnel should be set to burst about 50 yards in front of the target.

A special high-capacity shell, similar to common shell and fitted with a time fuze, is now used against aircraft by anti-aircraft batteries in the Navy.

Illuminating projectiles are shells fitted with a time fuze which, when exploded, releases and ignites a large charge of slowly burning pyrotechnic material, which gives off a bright illumination. A parachute is connected to the star pyrotechnics to delay their descent.

Rotating band.—A rifling band, called a "rotating band," is secured in an undercut score around the projectile near the base. The rotating band is made of copper; its diameter is equal to the diameter of the bore at the base of the grooves of the rifling. When the gun is fired, the lands of the rifling cut into the surface of this soft metal band, causing it, and hence the projectile to which it is secured, to turn in the bore. The rotating band also prevents the escape of the powder gases past the projectile, and centers the rear end of the projectile in the bore of the gun.

The small end of the shell is called the *nose* and the large end the *base*. Near the forward end of the cylindrical part of the shell is a machined bearing surface, called a *bourrelet;* this surface assists the rotating band in steadying the projectile as it goes out of the gun.

Marking of shells.—All shells have distinctive colors or markings which indicate the type of shell and the kind of bursting charge; these markings are as follows:

Black	Armor-piercing.
Slate	Common.
White	Shrapnel.
Unpainted	Target-practice.
Yellow	Explosive D.
Red	Gas.
Green	Anti-aircraft and bombardment.

Shells which have a white band around them carry tracers.

SUMMARY

(1) *The firing charge* is the powder charge which drives the projectile from the gun. The firing charge is of smokeless powder.

(2) *The ignition charge* is in the base of the sections of the firing charge. The ignition charge is of black powder.

(3) *The bursting charge* is in the shell. It is of black powder or of "Explosive D" or of TNT.

(4) The powder for a bag gun comes in silk bags, never in metallic cartridge cases.

(5) The ammunition for a case gun always comes in metallic cartridge cases.

(6) *A primer* fires the ignition charge in the gun.

(7) *A fuze* fires the bursting charge in the shell.

MAGAZINES AND SHELL ROOMS

Location.—Powder is stowed in specially constructed rooms, in places fully protected by armor, if the ship has armor, and as far away as practicable from the boiler- and engine-rooms. The rooms are placed as near as possible to the guns which they supply, first considering the necessity for protection. Turrets have their powder magazines and shell rooms directly below them. All powder magazines are fitted with permanent connections for flooding them quickly in an emergency. They are lighted with special water-tight lighting fixtures, containing two lights.

Powder magazines for other than turret guns are considerably scattered in both the forward and after parts of the ship. Members of the ammunition supply party carry the ammunition from the magazines to a belt conveyor that runs fore and aft on each side of large ships. This conveyor than feeds the various ammunition hoists to the guns. Shell-stowage spaces are provided near these fore-and-aft conveyors. All men should learn the location of the magazines and shell-stowage spaces on their ship, and understand the system of ammunition supply to their own guns.

The powder for only one caliber of gun is stowed in one magazine, except small case ammunition. Service ammunition for use in battle is always kept separate from target-practice ammunition. Fixed ammunition is always kept in a separate magazine and is stowed by calibers.

The **safety precautions** in regard to the magazines and shell rooms are as follows:

(1) No naked light shall ever be taken into a magazine or other compartment containing explosives of any kind.

(2) During firing, no ammunition other than that immediately required shall be permitted outside the magazines.

(3) The magazine flap doors of only such magazines as are being used to supply charges shall be open, the flaps in all cases being down, except during the time of actual passage of the sections of the charge through the door.

(4) There shall not be exposed (removed from the tanks) at one time, in any one magazine, more than one charge for each gun supplied by that magazine, and then only as necessary to supply the demand in the handling-room; nor shall there be permitted in the handling-room at any time an accumulation of exposed sections for more than one charge for each ammunition hoist.

(5) No matches shall be taken into the magazines.

(6) Always lead out fire hose in handling-room and connect to plug. This should be done at drill as well as at actual firing.

Duties of handling-room's crew.—The handling-room's crew keeps the gun supplied with shell and powder. The types of shell hoist and powder conveyors vary on different classes of ships. All men must know how their particular turret or gun is supplied with both shell and powder. Powder must be straight on the carriers of the hoist.

SAFETY PRECAUTIONS FOR ALL HANDS

Safety precautions are a part of *United States Navy Regulations* and they are posted near magazines, guns, etc. The safety of all hands depends upon a thorough knowledge of them, and strict compliance with them. Every one of the "Safety precautions" is important, and the ones which have not already been given and which are most applicable to seamen are quoted as follows:

(1) Safety devices provided shall always be used to prevent possibility of accident, and shall be kept in good order and operative at all times.

(2) No ammunition or explosive assembly shall be used in any gun or appliance for which it is not designated.

(3) Handling of ammunition shall be reduced to the minimum to prevent immediate accident and the occurrence of leaky containers, damaged tanks and cartridge cases, loosened projectiles, torn powder bags, etc. Powder stored for a considerable period in a leaky container is likely to deteriorate rapidly, with the attendant danger of spontaneous combustion.

(4) No other than drill ammunition shall be used for drill.

(5) Since the safety in handling and the disposition of ammunition depend upon the correctness of reports and records, care shall be taken not to obliterate identification marks on ammunition or to put it into incorrectly marked containers.

(6) Projectiles shall not be altered, nor shall fuzes or any other parts be removed or disassembled on board ship without explicit instructions from the Bureau of Ordnance. Projectiles shall not be allowed to rust or to become oversize through paint. Slings and grommets and other similar protective devices shall be removed before loading projectiles into guns. Since the slings are likely to jam the hoists, they shall be removed before sending up the projectile.

(7) A fuzed projectile or a cartridge case, whether in a container or not, if dropped from a height exceeding 5 feet, shall be set aside and turned into a naval ammunition depot at the first opportunity. Such ammunition shall be handled with the greatest care. However, if a shrapnel or an illuminating projectile with a 21-second fuze, not set at "safety," is dropped or struck so as to deform the fuze, the complete cartridge, if it is fixed ammunition (otherwise the fuzed projectile only), shall at once be thrown overboard or immersed in water until this can be done.

(8) Certain minor-caliber and time fuzes are armed by set-back instead of centrifugal action. Care must be used to avoid tapping or otherwise striking projectiles so fuzed. This precaution is particularly applicable to attempts to loosen such a projectile in the cartridge case by repeated light blows of a hammer or mallet. It also applies to unloading such a projectile wedged in the bore of a gun.

(9) Nose fuzes being sensitive, care shall be taken to prevent them from being struck, as by the gun in recoil, by ejected cases, by dropping, etc.

(10) Times fuzes which have been set shall be reset on "safety" before sending them below.

(11) In handling projectiles fitted with tracers, care shall be taken not to strike the tracer, as such a blow involves danger of igniting it.

(12) Smokeless powder shall not be exposed to the direct rays of the sun. Powder in bulk, in tanks, cartridge cases, ammunition boxes, ready-service boxes, or in any other containers shall be protected against abnormally high temperatures (over 100°F.).

(13) Smokeless powder which has been wet from any cause whatever must be regarded as dangerous for dry storage. Such powder shall be completely immersed in fresh water and kept immersed and landed at an ammunition depot at the first opportunity.

(14) Before performing any work which may cause either an abnormally high temperature or an intense local heat in a magazine or other compartment used primarily as a magazine, all explosives shall be removed to safe storage until normal conditions have been restored.

(15) Magazines shall be kept scrupulously clean and dry at all times. Particular attention shall be paid that no oily rags, waste, or other materials susceptible to spontaneous combustion are stored in them.

(16) Drill charges for bag guns soon become covered with oil and grease, and it is strictly forbidden to store such charges in magazines.

(17) Nothing shall be stored in magazines except explosives, containers, and authorized magazine equipment.

(18) Intense heat will detonate TNT charges. TNT exudate is explosive and highly inflammable. Therefore the outsides of cast TNT containers shall be kept free from exudate, and it shall not be allowed to accumulate on decks nor to come in contact with wood, linoleum, or other materials into which it will

soak. TNT exudate shall be removed before it hardens, shall not be scraped off with steel scrapers, and in scrubbing and wiping it up soap or alkaline solution shall not be used. Carbon tetrachloride is a safe and efficient solvent; but if cleared up in time, plain water and a stiff brush will generally remove the exudate from surfaces to which it adheres.

(19) During gunnery exercises charges in excess of the amount required to be available for one run shall not be assembled in the vicinity of guns mounted outside of turrets. No charge for a bag gun shall be removed from its tank, nor shall the tops of tanks be removed or so loosened that the bags may be exposed to flame until immediately before the charge is required for loading.

(20) As soon as a gun is loaded, the breech shall be closed without delay.

(21) The breech plug of a gun shall never be unlocked or opened while there is a live primer in the lock.

(22) The salvo latch shall be removed or made inoperative during any exercise which requires opening the breech, except when firing a loaded gun.

(23) When the fire of a bag gun is interrupted, otherwise than by misfire, and the gun remains loaded, a hangfire from an undetected ember from the last load may be in progress. Unless the previous loading interval was such that a careful and very deliberate examination of the bore previous to the last load precludes any possibility of this danger, the gun shall not be unloaded for 30 minutes, during which time the breech shall be kept locked and the gun pointed and trained in a safe direction.

(24) If a powder bag is broken to the extent of allowing powder to fall out, the command *Silence* shall be given and the loose powder shall be gathered up. If it is impracticable to utilize this section of the charge satisfactorily in loading, it shall be secured in a flame-proof container or immersed in water.

(25) Fitting fixed ammunition in guns by hand prior to firing may defeat its purpose by canting or loosening the projectile in its case. Such fitting shall not be done except by order of the commanding officer, and then not until the firing pins have been removed from the breech blocks and the firing circuits have been disconnected.

(26) Except in action, whenever a circuit breaker becomes so sensitive as to function due to the shock of firing, the circuit breaker shall be either overhauled or replaced and shall not be tied or fixed in position so as to be inoperative for the purpose for which designed.

(27) The covers of switches, circuit breakers, etc., shall be kept securely closed while powder is exposed in the vicinity.

(28) Any cutting of torpedo air flasks, accumulators, piping, or other receptacles for compressed air is prohibited.

(29) Torpedo air flasks shall not be hoisted from submerged torpedo rooms, struck below, transferred, or shipped while in a charged condition.

(30) In recovering a torpedo in the water the propeller lock shall be put on at the first opportunity and kept on until the torpedo is safely landed.

(31) Leaky or punctured torpedo torch pots may supply the flame to ignite combustible gases. Therefore,

(*a*) Torch pots of any sort shall not be stowed below decks.

(*b*) Torch pots on vessels with submerged tubes shall not be taken below until just prior to firing.

(*c*) Torch pots shall not be taken on board submarines except when it is con-

templated to fire torpedoes. They shall be habitually stowed on the tender or at the base.

(*d*) Torch pots shall, when practicable, be kept at least 20 feet from gasoline containers.

(32) Smoke boxes which misfire or have been in water shall not be taken on board ship or inside buildings or structures on shore. Gas masks shall be worn when entering concentrated smoke clouds.

CHAPTER 44

NAVY SIGNAL SYSTEMS

THE signal alphabets used in the United States Navy are the *flag,* the *semaphore,* and the *International Morse,* and all are important. A seaman, first class, is required to know the flags, with their names, and both the semaphore and Morse alphabets.

The flag system.—Flags are used at visible distances during daylight by hoisting them in such order that their meanings may be interpreted by signal books; one flag or certain groups of flags may carry these prearranged meanings.

Both the international alphabet flags, some of which are assigned special Navy meanings, and special flags and pennants are used in the United States Navy. The flags and pennants are shown in plates contained in the *Communication Instructions,* available on all ships. It will be noted that two of the alphabet flags are swallow-tailed flags; flags with this angular cut at the outer edge are said to be *burgees.*

The *flags are named* to prevent confusion due to the similiarity in sound of some letters of the alphabet. The name of each flag begins with the letter of the alphabet which it represents, for example *A's* name is *Afirm.*

The Morse code is the dot-and-dash system and in all Morse systems the group of dots and dashes which represent a letter must be made as one unit, with a clear break between each dot and each dash, and a more distinct break between letters. The Morse code must be memorized and is as follows:

A . —	N — .	1 . — — — —
B — . . .	O — — —	2 . . — — —
C — . — .	P . — — — .	3 . . . — —
D — . .	Q — — — . —	4 . . . . —
E .	R . — .	5 . . . . .
F . . — .	S . . .	6 — . . . .
G — — .	T —	7 — — . . .
H	U . . —	8 — — — — . .
I . .	V . . . —	9 — — — — — .
J . — — —	W . — —	0 — — — — —
K — . —	X — . . —	
L . — . .	Y — . — —	
M — —	Z — — . .	

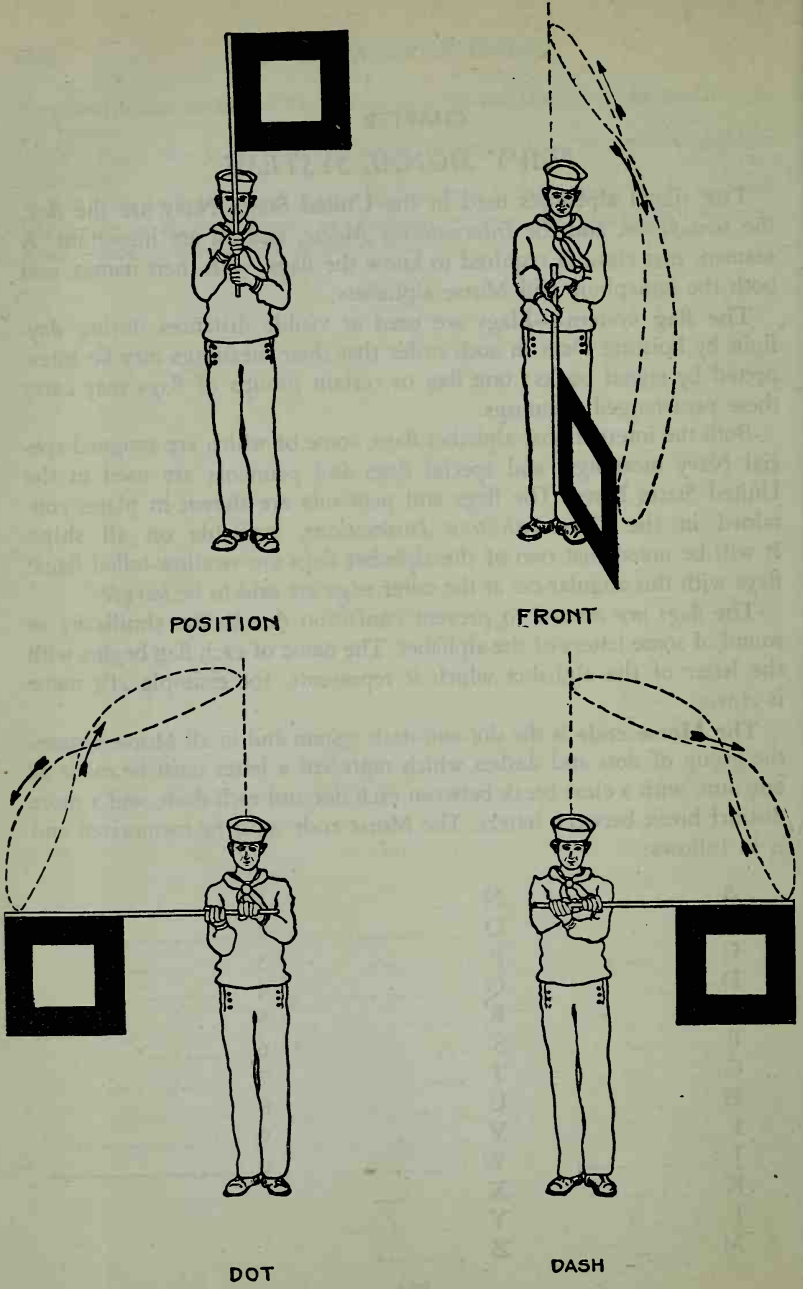


FIG. 44-1—Wigwag.

The handling of the flag for using this code in the *wigwag* system is shown in Fig. 44-1; this system is not ordinarily used aboard ship.

Flashing light.—The Morse alphabet is used in this method. Messages are transmitted by

(1) Searchlight.
(2) Blinker.
(3) Blinker tube.
(4) Aldis lamp.
(5) Mirrors (heliograph).

The characters are made by alternately exposing and obscuring the light. *A short flash* is represented on paper by a *dot* and a *long flash* represented on paper by a *dash* according to the following ratio:

A dot is taken as a unit.

A dash is equivalent to three units.

A pause between two elements of a letter is equal to one unit.

The character of a letter or numeral is composed of all of the above elements and the pauses between the elements that go to make up the flashing light equivalent to that letter or numeral.

Each character should be sent in a quick and snappy way. The time length of the character should never be more than it would be if the rate of sending were 16 words a minute. Slower rates of sending should be secured not by dragging out the characters but by leaving longer pauses between them.

In reading you must train yourself so that you will instantly recognize a certain display as the equivalent of a certain letter. Since you are learning to send so that the length of your dot and the length of your dash and the pause between 2 elements of a letter are the same as when sending at the rate of 16 words a minute, it follows that in receiving you must train yourself to recognize letters when they are sent at the same speed. To do this you must learn to recognize each letter by the whole display that represents it. It may take you some time to do this, but one day you will suddenly find that you have it. You must remember that you have to work to get it. It will not come without hard work. Do not get into the bad habit of trying to learn a letter by breaking it up into its elements. If you do this you will find later on that by the time you have broken up *Q* into dash dash dot dash, then searched your mind for the letter whose equivalent is dash dash dot dash, and finally decided that it is *Q*, the next 2 or 3 letters will have been sent and you will have missed them. Without having to analyze the display itself, you must learn that a certain display made up of short and long flashes means a certain letter.

FIG. 44-2—Method of using Aldis signal light to signal an airplane.

General.—*Radio* uses the Morse code plus special signs.

Under-water sound employs the same system as used in radio.

Special shapes may be prescribed from time to time in various units. Speed cones are standard means of indicating speed in day time. Certain shapes and combinations of shapes are often locally employed in submarine divisions as tactical signals.

Whistle signals are used by some units, especially destroyers, to indicate tactical signals. The Morse alphabet or special signs may be used.

There are other signals, which have special meanings, for example, gun signals for anchoring in a fog and indicating a ship in distress; pyrotechnics; recognition signals for use in war; etc.

PART FOUR

ADVANCED SEAMANSHIP AND GUNNERY

CHAPTER 45

ADVANCED SEAMANSHIP AND GUNNERY

Power boats 539
Aviation seamanship 546
Abbreviated rules for boat coxswains 556
Safety precautions—Gasoline-driven power boats 557
Other boats—Handling and uses 562
Rules of the road 573
Tides 583
Buoys 584
Storm warning signals 584

POWER BOATS

Stations and duties.—The crew shall include such of the following men as necessary for proper maintenance and safe handling of the boat:

(*a*) Coxswain, at the tiller or steering wheel, is in charge and gives orders by word of mouth or bell.

(*b*) Engineer, at the engine, is responsible to the coxswain for the operation of the engine.

(*c*) Bowman mans bow boat hook, or painter and boat line and tends forward weather cloths and fenders.

(*d*) Sternman mans stern boat hook and sternfast and tends after weather cloths and fenders.

When on a trip, the crew of a boat shall contribute to the seamanlike appearance of the boat by manning definite stations as follows:

(*a*) *Open boats.*—(1) Coxswain, at the tiller.
(2) Engineer, seated aft of engine facing forward.
(3) Bowman, seated starboard side outboard on forward thwart and facing forward (in rough weather may go to lee side).
(4) Sternman, seated port side outboard on after thwart and facing aft.

(*b*) *Decked-over boats.*—(1) Coxswain, at the tiller.
(2) Engineer, in engine-room.
(3) Bowman, standing on after deck, starboard side, and facing forward.
(4) Sternman, standing on after deck, port side, and facing forward.

When making a landing, as the boat approaches the landing the bowman shall stand in the bow facing forward with boat hook in hand, butt down. The sternman shall stand on the after deck or abreast the after thwart facing forward with boat hook in hand, butt resting on deck.

In rough water or in a strong tideway when use of boat hooks is impractical, the bowman and the sternman shall be stationed as in the preceding paragraph without the boat hooks. The bowman shall be ready to receive the boat line or the painter; the sternman, the sternfast or gangway grips.

General precautionary notes.—The presence of machinery in a boat will so affect the compass that a correct compass course cannot be taken from a chart. In order, therefore, to have the proper compass courses between ships and landings in foggy weather, the courses both ways must be observed and recorded in clear weather.

In making a landing, approach at *slow* speed on a course slightly converging with the face of the float or the gangway and a foot or so off therefrom. Stop the engine at such distance off as will allow the boat to coast to the landing and be stopped with little backing power.

Never cut into the landing at a large angle and with speed, with the idea of depending on backing at full power to throw the stern in. This is not a seamanlike maneuver. Furthermore, it places severe strain on the engine and reversing gear.

The bowman and sternman must not let the boat touch the float or gangway while alongside. It is bad seamanship to do so. With heavy service boats and boats with high-powered engines, the manner in which the coxswain handles his boat in making the landing will depend largely on whether the deck hands can keep the boat off.

When it is necessary to make a landing by rounding up to a heading opposite to the course to the landing, the boat shall be taken well off from the landing, swung in a reasonably large arc, and slowed down before arriving abreast of the float or gangway. This will prevent the wash made by the boat arriving at the landing at the same time as the boat makes the landing and in such force as to dash the boat against the float or gangway.

A power boat, in coming alongside a ship in rough weather or where there is a strong tide running, must always take a boat line. It should be made fast to a cleat on the inboard bow and run well forward on the ship. This arrangement will allow the stem of the boat to be thrown in or out by a slight touch of the rudder. The sternman must be particu-

larly cautioned not to attempt to pull in the boat's stern (*A*, Fig. 45-1).

If the boat is to remain at the gangway for some time, a second line should be run from the same cleat on the boat to a point a little forward of the accommodation ladder on the ship. By securing in this way, a

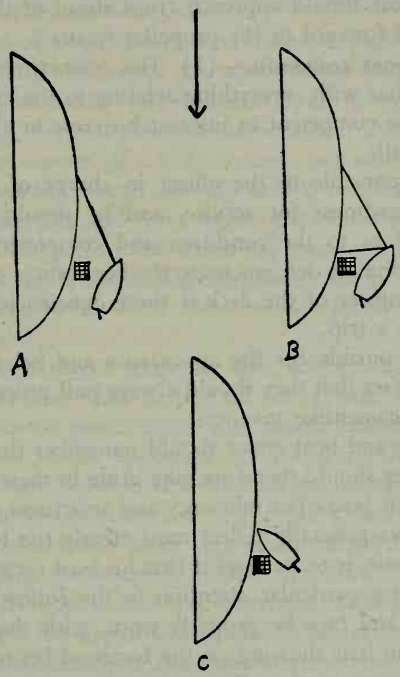


FIG. 45-1—Handling a launch alongside the ship.

boat with half rudder will be in position *B*, Fig. 45-1, as long as there is a current.

A boat is in a precarious position in *C*, Fig. 45-1. This condition has arisen because the boat has gone too far ahead of the gangway; the tide has gone against the outer bow and forced it against the side of the ship. A boat could get into this situation by coming into the gangway at such speed that it could not be checked by the engines, or by the failure of the engines to back. This should be a warning to all coxswains to make a landing at a moderate speed.

When making a landing, take into consideration that a loaded boat holds its way longer than an unloaded boat. Adjust speed in approaching the landing accordingly.

Avoid going alongside a vessel which has sternway or which is backing her engines. When the landing alongside must be made under such conditions, the boat should approach from ahead of the ship and land bow to stern well forward of the propeller wash.

Duties of a boat coxswain.—(1) The coxswain of a boat should be perfectly familiar with everything relating to the care and handling of his boat and be competent to instruct his crew in all details of general service or drill.

(2) He is responsible to the officer in charge of the boat for its cleanliness and readiness for service, and he should constantly keep himself informed as to the condition and completeness of the boat equipment, reporting all deficiencies to the boat officer or to his division officer, or to the officer of the deck if these deficiencies would prevent him from making a trip.

(3) He is responsible for the appearance and behavior of his boat crew and for the fact that they should always pull properly and conduct themselves in a seamanlike manner.

(4) Coxswains and boat crews should remember that they represent their ship, and they should therefore take pride in their own appearance and in that of their boat. The efficiency and smartness of a ship's boats and her boat crews generally reflect most clearly the tone of the ship.

(5) The coxswain is to be careful that his boat crew is always properly dressed, paying particular attention to the following points:

(*a*) That hats and caps be properly worn, with ship's name square to the front and no hair showing on the forehead below the hat or cap.

(*b*) That the brims of the white hats are never turned down unless necessary to shield the eyes from prolonged exposure to the sun.

(*c*) That trousers are never turned up, except in bad weather.

(*d*) That the men of the boat crew are dressed alike as regards oilskins, but oilskins are not to be worn unless it is actually raining or wet from other causes.

(*e*) That all members of the crew are uniform in regard to footgear, *i.e.*, either all wear shoes or all go barefooted.

(*f*) That in cold weather the men have their overcoats at hand.

(6) Owing to the constant use of power boats in port and their consequent greater liability to become dirty, coxswains of these boats

must devote particular attention to the neat and shipshape appearance of their boats and crews.

(7) The coxswain of a boat is responsible that the crew and enlisted passengers sit down in their proper places, that they do not sit on the gunwale, and that the men outside the canopy conduct themselves in seamanlike manner in extending salutes.

(8) Coxswains of power boats should devote particular attention to the proper handling of canopy curtains. When curtains are not required, they will be neatly rolled and stopped up and, when in use, they will be neatly stopped down to the washboard. It is not shipshape to stop down one corner of a side curtain, but when running into a head sea the coxswain may frequently find it necessary to haul down the curtains on one side and leave them furled on the other. Under all circumstances, when the curtains are in use they must be neatly stopped in place, as nothing is more slovenly than canopy curtains hanging loosely and flapping to the wind. However, for safety a ready exit from the boat is essential.

(9) Coxswains of boats must see that neither towels nor clothing are hanging in the boat when casting off for service.

(10) Coxswains of power boats will require the sternman to devote particular attention to the appearance of the stern sheets of the boat. Cushion covers shall be kept neat and clean, running lights in good condition, and the globe cleaned so that it will give a bright light. The boat flag when not in use is to be kept neatly rolled on its flagstaff and triced up overhead, not hanging loosely from the flagstaff, where it presents a slovenly appearance and interferes with passengers. When a boat is called for the use of commissioned officers, the sternman will spread the boat cloth neatly in the stern sheets of the boat and see that the foot cloths or ladder (if used) are on the proper side of the boat, *i.e.,* on the side from which it is expected the passengers are to enter.

(11) When a boat is called away, the coxswain will enter the boat over the boom, will see that the crew is in the boat and everything is ready, and then drop down to the gangway. The coxswain then reports to the officer of the deck or to the boat officer that the boat is at the gangway ready for service and, in the absence of a boat officer, receives his orders, which he must make sure he clearly understands.

(12) On his return to the ship, he will report to the officer of the deck that orders have been complied with. He will also report anything amiss on the ship that is visible from the boat, such as windsails that

require trimming, anything hanging over the side, or clothing in improper places. He will then see that his boat is properly secured to the boom.

(13) The crew shall not be allowed to absent themselves from the boat while it is at the landing without proper authority. If necessary for any member to leave temporarily, the coxswain will report the fact to the officer of the deck immediately on his return to the ship.

(14) The coxswain shall never permit smoking in a boat that has a gasoline engine, nor in other boats, except when special permission has been given.

(15) When boats are ordered to secure, they shall be reported secured, by the coxswain, to the officer of the deck.

Towing.—(1) In ordinary cases of towing (an unladen boat in a smooth sea), the towing boat places herself in line ahead and passes the tow her towline; when the line has been secured, the towing boat goes ahead very slowly until slack in the towrope is taken up.

(2) The sternman in the towing boat must not give the tow his towline until she is pointed fair for towing. He will then take in the slack of the towline, keeping a strain on it, and gradually pay it out, thus getting away on the tow slowly. This latter precaution is particularly necessary if the tow is at all heavy.

(3) Though it is frequently impracticable, it is always preferable for the towing boat to give the tow a line (instead of vice versa), which the tow should tend and keep ready for letting go in an instant. If this is not done and the tow gives the towing boat her bow painter, which is shackled in the bow, a hatchet or sharp knife should be kept at hand in the towed boat for cutting the towline in an emergency.

(4) When being towed astern of a large vessel, haul in the towline to a comparatively short line so as to remain close under the counter, with the bow partly out of water.

(5) Except in the case of unladen boats in smooth water, a number of boats should never be towed tandem (separate lines between boats), for in a large tow this brings a considerable strain on stem and stern timbers of the foremost boats. To avoid this strain, the towing boat should pay out sufficient line to reach the bow of the last boat, the other boats being secured to it by slip lines at bow and stern.

(6) If towing alongside, lead the towline from as far forward on the towing boat as possible; on the tow take this line in the forward rowlock or bow chock; or take a turn around the towline with the bow

painter. Make fast the towline farther aft. The towing boat secures at the quarter of a large tow.

(7) In towing, the stern of the towing boat should be kept well down by shifting weights aft if necessary. This keeps the propeller well immersed and gives it a good hold on the water.

Running a line.—(1) Coil the greater portion of the line in the stern sheets, but take end and enough in the bow to make fast when you reach the landing. Stand off and let the ship pay out more line until you are sure of having enough in the boat to reach, then pay out from the boat. Always have plenty of good seizing stuff for making all secure and, if you are to stand by the line, have an ax ready for cutting in case you are ordered to do so.

(2) If laying out with the tide, take less line in the boat than otherwise; if against the tide, it will save work to take all the line in the boat, pull up, and make fast, then bring the end back to the ship. With a long line to be laid out in a strong current it will usually be necessary to have several boats—one to run away with the end, the others to underrun the line at intervals, floating it and pulling upstream with the bight.

(3) If the line is to be secured to a bollard, put a bowline in the end before starting and throw this over the bollard. Bend on a heaving line and let the bowman throw this, if hands are standing by to receive it, or jump ashore with it himself if necessary.

Boarding a wreck.—(1) *Whenever practicable* a vessel, whether stranded or afloat, should be *boarded from leeward,* as the *principal* danger is that the boat may strike the vessel or be swamped by the rebounding of the sea, and the greater violence of the sea on the weather side of the vessel renders such accidents more liable to occur on that side.

(2) *If a stranded vessel* is broadside to the sea, the chief danger in boarding to leeward is the possible falling of the masts, or that the boat may be stove in by wreckage alongside. Under such circumstances, it may be necessary to take a wrecked crew into a lifeboat from the bow or stern of the wreck. In boarding a wreck that is stranded on a flat shore, lifeboats usually anchor to windward and veer down from a safe distance until near enough to throw a line on board.

(3) *In rescuing people* from a drifting wreck, approach from leeward, taking care to avoid wreckage floating alongside. If there is much wind, it is best to lay well off, throw a strong line aboard, have the people secure the line around their bodies, one at a time, and jump

overboard, for, if the boat gets alongside of a wreck which is rapidly drifting to leeward, there is danger of swamping and much difficulty in getting her clear of the side.

(4) Should it be necessary to go alongside, it is preferable to run the bow or stern to the gangway or sea ladder, keeping her headed at right angles to the ship's keel, ready for pulling or backing away.

(5) An exception to the usual rule of boarding a drifting vessel to leeward occurs in the case of a vessel of very low freeboard, such as small schooners, etc. Board such craft on the weather quarter to avoid being stove in by her main booms, chains, etc.

AVIATION SEAMANSHIP

Aviation seamanship relates to the water handling of seaplanes and amphibians in all its phases and also to the operation of surface craft, large and small, in connection therewith.

Certain fundamental characteristics of seaplanes are of the utmost importance and must be taken into account whenever these craft are to be handled on the water, either in independent operations or in operations in which surface craft are involved, such as towing, hoisting aboard ship, or lowering from ship to the water. These fundamental characteristics of seaplanes include the following:

(*a*) On the water with engine idling, a seaplane normally heads into the wind.

(*b*) On the water with engine stopped, a seaplane drifts quite rapidly before the wind and heads into, or very nearly into, the wind.

(*c*) When anchored or moored to a buoy with no current in the stream, a seaplane rides headed into the wind.

(*d*) When anchored or moored to a buoy with current running, a seaplane will be carried down stream by the current but will also tend to head into the wind, and the position which it assumes will depend on the resultant effect of both wind and current.

(*e*) The construction of seaplanes, particularly of the wings and tail surfaces, is such that they are liable to severe damage if brought in contact with small boats or with the ship's side. Hence, the greatest care must be used in handling boats around seaplanes or in bringing seaplanes alongside ships.

Small-boat handling in connection with seaplanes.—As a general rule light-draft boats which are easy to maneuver and have a low freeboard should be used in going alongside seaplanes. Boats best suited for

this purpose are 26 foot motor whaleboats and 24-foot motor launches. In an emergency, any type of boat may be used. However, the boat used should have good backing power.

Approaching a seaplane under various conditions.—The different duties performed by boats in connection with seaplanes are as follows:

(1) Placing crews aboard planes.
(2) Removing crews from planes.
(3) Taking a plane in tow.
(4) Towing planes to a ship to be hoisted.
(5) Going alongside planes that have crashed.
(6) Fueling planes from boats.
(7) Towing planes away from the side of a ship.

Coxswains of power boats tending planes must be thoroughly familiar with the maneuvering qualities of their boats. In approaching a seaplane and going alongside in a motor whaleboat or motor launch, consideration must be given to state of sea, wind, and tide. In general, boats should approach:

(*a*) A drifting seaplane from windward.

(*b*) An anchored seaplane against wind or current, depending on which is the predominant factor. This approach should always be made in such a manner that the boat will tend to drift away from the seaplane in case of engine failure.

The following rules are of particular importance:

(*a*) Avoid contact between boat and seaplane because of extreme delicacy of the latter.

(*b*) Use minimum power.

(*c*) Do not approach drifting seaplane from the stern.

(*d*) Require boat personnel to fend off by hand, and not with boat hooks.

(*e*) In the event of swells from passing ships, get clear until disturbance has subsided.

(*f*) Transfer of personnel must be effected without unnecessary delay.

(*g*) Never go alongside a seaplane which has its engines running unless specifically ordered to do so by the pilot and then keep clear of the propellers.

(*h*) Should it be necessary to tend a seaplane with a large power boat that is not capable of being easily maneuvered, the boat may be anchored ahead of the seaplane and allowed to drop back to the desired position by veering the necessary amount of chain. In the case of small

seaplanes, the boat may be anchored and the seaplane pulled up to the boat.

The towing of seaplanes, regardless of the conditions of wind and sea, or the special conditions which may dictate the necessity for this operation, involves consideration of the fundamental characteristics of these craft outlined above. The tendency of the seaplane to head into the wind is of primary importance. Each case in which towing is required may present special problems for which no specific solution may be presented here. Varying conditions of wind and sea, the material condition of the seaplane to be towed, the ability of the personnel aboard to assist in the operation, and the availability and character of the surface craft and material required present problems which can only be solved on the spot. However, experience has indicated that towing operations fall generally into two major classes:

(*a*) The towing of small pontoon-type seaplanes by small boats for relatively short distances.

(*b*) The towing of patrol-type seaplanes by large or small surface craft for distances which may be relatively great.

This arises from the fact that all capital ships, cruisers, and carriers are equipped to hoist aboard the small types of seaplanes and to stow them properly, while only a very few tenders are capable of hoisting aboard a large seaplane of the patrol class and then only under very favorable conditions. The operations of the smaller types of seaplanes with the fleet are such that, in case of forced landing where towing is required, there is almost invariably a ship near-by which is equipped to handle the seaplane and which can furnish the boat to tow it alongside. On the other hand, patrol-class seaplanes operate over large sea areas in which the ready assistance of ships equipped to take them aboard is seldom available.

The smaller types of seaplanes are not equipped with permanently installed towing gear. Thus, in any towing operation, it is necessary to provide in the towing boat all gear which is required. This gear includes:

(*a*) Towline, 21-thread Manila line, 20 fathoms.

(*b*) Wing lines, heaving line, 2 lengths, 20 fathoms each.

(*c*) Chafing gear (for seaplanes not equipped with towing shackles at base of forward pontoon struts).

The boat should, as previously stated, avoid getting to leeward unless the seaplane is anchored, in which case the approach is invariably made from leeward. The length of towline specified above is sufficient to per-

mit the boat to approach a drifting seaplane bows on from windward, pass the towline, and, paying out the line, turn and head into the wind before taking a strain. An alternate method of approach which may be found superior in light winds is to approach from abeam of the seaplane and turn into the wind just ahead of the seaplane, passing the towline as the turn is made. In either case, the boat must be kept directly to windward and, as soon as the towline is passed, must maneuver to head into the wind directly ahead of the plane. The plane is then pulled up near enough to the boat to pass wing lines, if towing is to be done across wind. It is wise to use wing lines, at least on the windward wing in any case, as they are very useful in steering the plane.

The towline is secured around the lower end of the float struts and passed through the cleat at the bow of the float. Chafing gear should be used, for which kapok life preservers will suffice. Towing up wind presents the simplest situation as the seaplane tends to head into the wind and has no tendency to yaw. Towing across wind should never be attempted without a windward wing line which must be tended constantly to prevent yawing. It is preferable to have the ship to which the plane is being towed take position to windward of the plane which, in addition to permitting an up-wind tow, provides a lee. Upon reaching the ship the towline and wing lines are passed to the deck and the plane hauled under the hook.

Towing large seaplanes.—With the increased employment of large, patrol-class seaplanes, it is quite probable that occasions will arise when it will be necessary that destroyers tow this class of seaplane to sheltered water after forced landings. This towing will be done in the open sea under varying conditions of wind and sea.

Passing and securing the towlines.—The destroyer should approach the drifting seaplane from leeward steaming up to windward. Pass the seaplane on either side at such a distance that there is no danger of the plane being thrown against the destroyer's side but such that the towline can still be passed. Three methods by which the towline can be passed are (1) heaving line, (2) line-throwing gun, (3) dragging a buoyed line to leeward across the path of the drifting seaplane. The third method should be used as a last resort and should be necessary only in extremely bad weather. The line should be buoyed by cork or wood floats or by ring life preservers. Do not use kapok life preservers as they become water-logged and sink.

The following towing equipment is required: one 4-inch Manila towline, 50 fathoms; two 21-thread Manila wing lines, 50 fathoms; one

drogue (a bucket will suffice); and 8 fathoms 3/8-inch wire; adequate chafing gear.

Patrol-class seaplanes are now equipped with tow fittings on the keel about one-fourth the distance from bow to tail. To this fitting is permanently secured the towing and mooring pendant. Wing lines are passed and secured to fittings provided on the wing-tip floats. An additional fitting is located on the keel about one-fourth the distance from the stern to the bow. To this fitting is shackled the 3/8-inch wire line and drogue (bucket).

After all lines are properly secured on board the plane, the personnel should be removed, since their capabilities in an emergency are limited to cutting the aircraft adrift and this can be done with more facility and speed on the towing vessel. The airplane hull should be made as watertight as possible by closing the water-tight bulkhead doors and putting on the cockpit covers and plates. Spoiler boards can be securely lashed across the top of the lower wings above the leading edge partially to destroy the lift of these wings; any 1 x 4-inch plank the same length as the lower wings will serve for this purpose. Personnel should then be removed from the airplane.

The towline is led through the stern chock of the destroyer and the two wing lines through the quarter chocks, chafing gear being used where necessary.

Adjusting the towlines.—Sufficient experienced personnel should be stationed on the stern of the destroyer to tend the towline and wing lines. The length of the towline used should be about 150 feet. With this length, the seaplane will ride on the after face of the second stern wave with the wing-tip pontoons inside the smooth water of the slick formed by the destroyer's wake. The towline length will have to be adjusted to allow the seaplane to ride in this position and the wing lines adjusted correspondingly.

The wing lines will require most careful tending and should be tended by the most experienced men. They should be left slack so as to drag in the water, pulling at approximately a 45-degree angle from the wing span. This drag furnishes an excellent means of damping sudden strains and also forms a balancing drag on each wing, which is immediately and increasingly effective in correcting a yaw. The wing lines must be adjusted for any given condition and should be tended at all times. The parting of one wing line requires immediate release or slackening of the other and possibly the cutting of the towline to prevent damage to the tow.

The sea anchor, or drogue, is necessary for speeds below 10 to 12 knots on all courses but is not required for speeds above 12 knots, except when towing with the wind forward of the beam.

Starting the tow and working up to speed.—The tow should be started slowly and the working up to the desired towing speed should be done by increments. Below 10 knots the seaplane acts sluggishly and yaws considerably.

When working up to speed there is a twilight hour between 10 and 15 knots just before the seaplane gets up on the step when she acts very badly. After getting up on the step, the seaplane rides high and tows nicely on any course.

In bringing the plane up to towing speed under any conditions, it is imperative to increase speed slowly, tending all lines and varying them as desirable to reach the best towing position considering wake, waves, and wind, and to balance the wing lines to the most advantageous drag. This is particularly necessary in working up to speed up wind. In this case the suddenness with which a wing will bury and carry away gear is too marked to be controlled satisfactorily by deck personnel.

Towing speed.—With winds up to 15 knots' velocity, towing can be safely conducted up to 20 knots' speed when the wind is from abeam or abaft the beam. The effect of wave height is to reduce the safe speed of towing as waves increase in height. As the wind hauls forward of the beam, the leeward wing-up float tends to bury and produces yaw, pounding, and generally adverse conditions of safety. The only cure for this is reduction of speed. Towing directly down wind is the safest and best, and towing directly up wind increases the bad behavior of the tow and requires a reduction of speed. Towing in smooth water and light winds is feasible and safe at speeds of 20 knots and can be done on any heading. In rough water or medium to high winds, towing can be safely done at speeds from 15 to nearly 20 knots when the wind is from abaft the beam. When the wind is from forward of the beam, the speed must be reduced and the seaplane more carefully tended. As the wind and waves increase, the towing speed must be reduced to that speed at which the seaplane tows most comfortably.

Rudder used for turns.—At 10 knots in the open sea, 10 degrees of rudder is ample in making a turn. It may be necessary to use 15 degrees to start the turn but it should then be eased to 10 degrees. At 15 knots, use from 7 to 10 degrees and at 20 knots, from 3 to 5 degrees. When changing course in a seaway, change only a few degrees at a time and then straighten out so that the wing-tip floats will not leave the

smooth water of the wake. If conditions are adverse for heading directly for sheltered water, it is better to tack in by heading on courses on which the seaplane will experience the best towing conditions.

Summation.—(*a*) At all times listen to what the aviator may have to say. He knows the capabilities of his seaplane better than you do.

(*b*) Rig the towline so that the seaplane is on the after face of the second wave of the wake.

(*c*) Work speed up slowly until the seaplane is at least part way up on the step, about half a destroyer's acceleration curve is proper.

(*d*) Place an equal strain on both wing lines and leave sufficient slack for yaw, otherwise the seaplane will tend to tow by one of the wing lines.

(*e*) Do not attempt to tow to windward at any great speed.

(*f*) Change course slightly to determine the most comfortable towing course.

(*g*) If trying to make port in a heavy sea, tack in if necessary.

(*h*) Use a drogue (bucket) on all headings at speeds below 10 knots and at higher speeds when the wind is from forward of the beam.

(*i*) Do not worry if the fabric is torn off the lower wings. If the sea is very heavy the fabric on the lower wings should be slit to allow any water shipped to drain.

(*j*) Remove all personnel from the seaplane.

(*k*) Tow at as fast a speed as possible with safety, the seaplane rides easier, but do not permit the plane to "bounce" or yaw.

(*l*) Have positive and instant communication between the bridge and the after deckhouse.

(*m*) Have an ax ready on the stern for cutting the towline.

(*n*) Have the most intelligent men stationed continually to tend the wing lines ready to slack one if the other carries away.

Fueling aircraft.—Aircraft can be fueled alongside a ship in the same manner as a ship's boats. Certain precautions and equipment to insure safety and immunity from fire must be observed and provided, namely:

(1) Ground the hose nozzle to the funnel and to the tank to prevent static discharge of electricity and probable ignition of gasoline by the resultant spark.

(2) Foam and CO_2 fire extinguishers of the maximum size on hand, placed in the immediate vicinity on deck.

(3) Fending poles, pudding fenders, 18-thread Manila wing and

bow securing lines, and rope sea ladder at hand. The lines are never thrown to the seaplane until all its engines are stopped.

(4) Cans and line for lowering lubricating oil or water.

(5) Funnel and chamois skin.

When conditions do not permit fueling alongside or astern, it becomes necessary to equip a ship's boat for the purpose. Drums of gasoline are placed in the boat, filled, and the boat secured alongside the after part of the hull of the seaplane at its anchorage. Personnel in adequate number to fend off by hand must be in the boat. A hand pump and hose as well as other equipment enumerated above must also be provided. Failing this, small containers to transport fuel from boat to seaplane must be utilized.

Stowing aircraft aboard battleships and cruisers.—The most commonly used stowage of aircraft on battleships and cruisers is the launching car mounted on the catapult. The launching car rests on four shoes or slippers which are grooved on the inner side to permit engagement with the steel slides running horizontally the entire length of the catapult, on both sides along the top. The catapult itself is a built-up, box-like steel girder, braced and re-enforced to withstand the strains imposed in supporting and launching aircraft. The topmost member, a steel plate, extends beyond the two vertical side members 2 or 3 inches to form the track on which ride the launching car slippers.

The most desirable spot for permanent stowage of the launching car and seaplane is directly over the turntable midway between the catapult ends. Any other position tends to warp the turntable rollers so that the training mechanism will fail to function with ease and smoothness of working parts. However, other considerations may influence more strongly the securing position and that must be determined on each type and even in some cases on each individual ship.

The launching car is first secured with one forward and one after brace wire on both sides to prevent sliding lengthwise along the catapult. The braces are constructed to provide easy and rapid installation or removal by sister-hooks or other suitable terminals. A turnbuckle in the brace wire or cable must be provided to eliminate any slack. Some means of fastening the catapult itself may be found necessary, such as cables led to the deck at either end of the catapult so that stresses on the training mechanism are not imposed due to the ship's motion in a seaway.

The aircraft itself is an amphibian or seaplane which rests on the car

with the forward part of the main float keel touching the center line and the after part riding on a vertical member known as the saddle. The seaplane float has a male keel fitting that engages into a corresponding female fitting on the launching car forward. A cable leading from car to seaplane float aft on each side completes the customary fastenings.

Additional cables securing the propeller hub, forward and after fuselage ends, and wing tips to catapult or deck must be installed to prevent motion of the plane when the ship is heaving violently in severe weather. Manila lines or broad canvas straps securely lashed around the main float and led down to the catapult contribute much to the security of the plane. If the character of stowage permits, vertical supports under the extreme ends of the wings will also add to safety. No definite system can ever be prescribed that will be universally applicable, but the fundamental features indicated serve as a guide toward obtaining a simple, sturdy, effective method of securing which can be quickly installed or removed and will create the least interference with the ship's other activities.

To prevent working of the movable control surfaces, wing and tail battens or stoppers are installed; the controls within the aircraft are to assist rigidity. Cockpit and engine covers provide the only shelter from the weather that can be furnished for seagoing, ship-based aircraft on an operating status.

Hoisting out.—The individual charged with responsibility for lowering the plane first stations the necessary personnel. The winch man tests the hoisting machinery and when satisfied swings the boom over the plane, ordinarily on the catapult. The slack in the plane hoisting sling is taken out after the hook is engaged, preliminary to casting off all securing devices. The plane engine is started and allowed to run only at low speed while wing and tail lines are reeved through handholes or suitable eyelets. When all is clear, with the crew in the plane ready for flight and other personnel ready at their stations for lowering away, the plane is hoisted clear and lowered into the water. In doing this, the boom is swung outboard to give maximum clearance from the ship's side. The hook is quickly removed or tripped by the plane's crew the instant it is water borne. One end of the wing and tail lines is released and allowed to run through the handholes which permits taxiing clear preparatory to take-off. One of the most essential features in lowering aircraft is the stationing of several men with light long poles fitted with a padded crutch for fending off a swaying plane. The point of application of these poles must be specifically selected from experience

so that injury to delicate parts of the plane structure will not result. To further reduce swinging on the hook, a line led to the hook itself and handled by one or more men on deck is of material assistance to resist the decided tendency during the roll of the ship for the plane to sway out from the side and back again.

Hoisting in demands the same organization. The boom is placed in the most favorable spot for hooking on, well clear of the side, approximately in the same location selected for releasing the plane when it was lowered. The plane taxies on a course parallel with the ship's heading to a point where the hook may be engaged in its sling. A strain is taken instantly with a minimum initial strain or shock and the plane promptly hoisted clear of the water. Wing lines are thrown from the ship to the plane and attached by the plane's crew as expeditiously as possible, after which the plane is hoisted on board, lowered on its catapult launching car, and secured without delay. When hoisting aboard at sea, it is essential that the ship be dead in the water.

The foregoing briefly indicates the bare elements of lowering and hoisting seaplanes by parent ships. Variations in procedure have been successfully introduced from time to time but the essentials have been included in the description.

Recovery of wrecked aircraft.—The initial step in recovering a damaged or disabled seaplane on the water after the personnel are saved or are not in immediate danger requires that the rescue vessel proceed to a spot alongside, where a line can be thrown from the deck to the plane. Failing this, a boat must be lowered to tow the plane to the ship and efforts commenced to hoist it from the water. The hoisting sling located above the upper wing of planes operating with the fleet is almost without exception the best point of attachment for the hook suspended from the boom. Unfortunately, many damaged planes assume an attitude which does not favor this procedure, making it necessary to improvise a jury rig to proper strength members. The most useful of these points of attachment are the propeller hub, engine mount, arresting hook or sling extension (for carrier airplanes), or the junction of braces in the fuselage where the arresting hook is normally fastened when installed. In the event that none of the foregoing is available or proves adequate, then straps, preferably wide, must be passed through a fuselage bay and led to the hook or common junction point, using chafing gear and spreaders.

As the damaged plane emerges slowly from the water, the fabric in wings and fuselage must be opened sufficiently to release the water which

has entered the plane. Jackknife slits in the fabric are the easiest means of lightening the load by the release of water. If the hoisting gear cannot then handle the load, as a last resort a hole must be punched in the bottom of the hull or pontoons to permit the water to run out.

ABBREVIATED RULES FOR BOAT COXSWAINS

Always (1) See that required equipment is in boat.

(2) Have key to boat box in boat before leaving ship (when boat box is carried).

(3) See that boat and boat gear are clean and shipshape.

(4) See that crew is in proper uniform.

(5) See that oarsmen use oars assigned to their thwarts.

(6) Require crew to maintain silence.

(7) Rise and salute superior officers when they enter and leave the boat.

(8) See that enlisted men who are passengers in the stern sheets rise and salute commissioned officers when they enter the boat.

(9) In getting out, tossing, boating oars, etc., see that men handle oars smartly with arm muscles, keeping body as erect as possible.

(10) Always give commands in a clear, sharp, and distinct voice.

(11) Give preparatory commands when they are necessary, to prevent taking the crew by surprise.

(12) Give commands at proper period of stroke, *i.e.,* when the blade is in the water near the beginning of the stroke.

(13) Require the crew to pull a strong, regular stroke, using the back.

(14) Require the crew to feather their blades.

(15) When laying on oars, see that the crew sits upright, with hands on oar handles, blades trimmed horizontal.

(16) Keep boat bows on to a heavy sea.

(17) Watch the ship for signals.

(18) Obey boat recall as soon as made out (keep a signal plate showing boat recall and boat number fastened in boat).

(19) See that fenders are over the side when coming alongside a gangway or landing.

(20) See that sheets are properly tended while under sail.

(21) See that sails are well set and trimmed.

(22) Reef in time.

(23) See that every duty in a boat is done in a quick, seamanlike manner.

(24) Correct every infraction of regulations the moment it occurs.

(25) In hoisting the boat, hook the forward fall first.

(26) Report immediately on return to the ship any damage to boat or loss of boat gear or equipment and circumstances attending same.

Never (1) Belay a sheet while sailing.

(2) Attempt to gybe a main boom in a fresh breeze.

(3) Stow away boat flag when wet; colors will fade.

(4) Unhook the forward fall first in lowering.

(5) Have after fall hooked when forward one is unhooked.

(6) Carry heavy weights in extreme ends of boats.

(7) Go over a ship's gangway to or from a boat without saluting.

(8) Allow talking in a pulling boat while under way.

(9) Allow the men to absent themselves from the boat at landing without proper permission.

(10) Lie alongside shore landing longer than is required to land.

(11) Pass a senior boat without permission.

(12) Steer with rudder in a heavy sea if steering oar is fitted.

(13) Land through surf unless expert in doing so or absolutely necessary.

(14) Leave boat after it is capsized until rescued.

(15) Permit the crew to lounge when lying on oars.

(16) Permit any member of crew to stand on thwarts or sit on the gunwale.

(17) Permit any member of crew to climb a mast. Unstep if necessary.

(18) Permit towels or clothing to be hung up in a duty boat.

(19) Jam a tiller down too suddenly or too far.

(20) Use metal end of boat hook on side or paint work.

(21) Desert boat in case of gasoline fire until it is determined that it has got beyond the capacity of the fire fighting gear at hand. Gasoline tank explosions are very rare in the early stages of fire.

SAFETY PRECAUTIONS—GASOLINE-DRIVEN POWER BOATS

It must be generally understood that gasoline involves a very serious fire hazard and is as dangerous as any explosive on board ship, and all persons are enjoined to observe strictly the safety precautions pertaining to the use and handling thereof.

Of equal importance to the requirements that no man, unless a qualified swimmer, shall be assigned as a member of a power-boat crew, is

the requirement that before assignment he shall also have a thorough knowledge of the safety precautions pertaining to the use and handling of gasoline, and the use of fire extinguishers.

The following inspections apply before starting an engine that has not been in use since the day before, has been under overhaul, or has been idle for an appreciable period. These inspections should also be made daily when secured in the cradles:

Engine.—See all electric connections are in place and secured.

Gasoline piping and tank fittings.—Inspect for loose connections and leaks and immediately remedy any found. See that tank filling plug is in place. See that there are no openings in tanks from which gasoline may escape during rolling and pitching or through which gasoline vapor may be forced out during fueling operations.

Wire gauze screens.—See if intact and clean. Those over carburetor and breather-pipe connections must be securely clamped so that they cannot be blown loose in case of a backfire or a crank-case explosion.

Carburetor drip pan.—Inspect and empty. The drip pan should be inspected, emptied, and washed, when the engine is stopped, at intervals when boat is running during the day, and before hoisting to its cradles. Drip pans are safe only when kept empty.

Bilges and sumps.—Inspect to see if dry and free from gasoline vapor and oil.

Ventilation is of prime importance at all times and all spaces subject to accumulation of gasoline vapor shall be inspected and thoroughly ventilated. The time when gasoline fires are most liable to occur is when starting an engine. Before starting, every precaution should be taken to insure that the bilges are not only opened up to ventilation but that gasoline and gasoline vapor present is removed. Where a special exhauster fan is fitted, it should be run at least 5 minutes before starting the engine. During fueling, the engine hood or casing shall be opened in the top to permit free circulation of air, and the cover shall not be closed after fueling until the engine has been started and is operating in a satisfactory manner.

Gasoline fire extinguishing.—In case of gasoline fire, the danger may be minimized by using one or more of the following methods of extinguishing the fire:

(1) Use carbon dioxide (CO_2) extinguishers (carbon tetrachloride or foam types of fire extinguishers, if still on board).

Note.—The solution in foam-type extinguishers is injurious to electrical equipment, and the use of it involves risk of causing short circuits.

(2) Smother the fire, if possible, by means of wet blankets, mat-

tresses, or similar material. If the fire is in a closed compartment, seal it to prevent access of air. If possible throw into the compartment one "opened" carbon dioxide portable extinguisher, or several. Each 15-pound capacity portable extinguisher is capable of rendering an atmosphere of 250 cubic feet sufficiently inert to extinguish a fire.

(3) Water is effective in extinguishing gasoline fires only under the following conditions:

(*a*) To sweep the flames on the water away from a ship or dock.

(*b*) Completely to flood a compartment on fire.

(*c*) When it can be supplied with sufficient pressure and volume to have a smothering effect and distributed over the entire area by spray, otherwise the burning gasoline floating on the surface of the water may spread the fire to other substances.

General.—(1) *Smoking.*—No smoking nor naked lights shall be permitted in power boats.

(2) *Fueling.*—(*a*) No transfer of gasoline to a boat from a drum or other portable container shall be made unless the container has been removed from the proximity of other containers. An adapter shall be provided with a screw thread that will fit the opening in a standard gasoline drum, the other end to take a standard 1¼-inch rubber-metal hose.

(*b*) Gasoline power boats shall not fuel except when in the water and with the engines stopped, and where possible, near enough to the ship to receive aid in case of emergency.

(*c*) Ship's boats may fuel from the bow, midships, or astern, clear of other boats, depending upon the arrangements, and no smoking nor naked lights (such as oil lanterns, candles, open flames, etc.) shall be permitted in the vicinity while fueling.

(*d*) To avoid danger of ignition of gas from a static spark, the filling hose nozzle is provided with a grounding wire which should be grounded to some part of the tank which is to be fueled, *prior to the opening of the filling flap.* This connection will equalize electric potential. The ground should be maintained throughout the operation of fueling and until the hose has been withdrawn and the filling flap closed. The use of a funnel increases the danger from sparks. It is therefore preferable to insert the nozzle of the grounded hose directly into the filling opening on the tank.

(*e*) Except in emergencies, boats shall not be fueled at night.

(3) *After fueling.*—Before starting the engine, it is particularly important to clear the boat compartments and bilges of any gasoline vapor that may be present from the operation of fueling. The same precau-

tions apply should gasoline vapor be noticed in the boat while under way. Gasoline fires have occurred through contact with sparks from some part of the electrical equipment while the engine is turning over. It is safer, for both personnel and material, to stop and clear out gasoline vapor and to remove its cause than to continue running the engine. When stopped for this purpose, one of the crew should stand by ready to operate the fire extinguishing equipment. This is of particular importance in connection with motor boats having closed engine compartments.

(4) *Fueling from shore stations.*—The same general precautions must be observed when fueling from shore stations. Serious fires have occurred due to absence of grounding connections. Before permitting a boat to fuel, an inspection of such stations should be made by the officer or petty officer in charge of power boats to see that grounding connections are provided either by the boat or the station. These grounding connections should be of wire or solid metal and care should be taken to see that the contacts are positive. Wrapping wire around the metal parts of the filling hose is not sufficient and the use of chains is not considered a positive method.

(5) *Oil lanterns* shall not be used in gasoline-driven power boats when the electric lighting system is in good operating condition. If oil lanterns are in use, when it becomes necessary to fuel, they shall be extinguished and portable electric hand lanterns or flashlights used.

(6) (*a*) *Bilges and sumps* shall be kept dry and frequently washed out to clear them of gasoline and oil. They should be washed before hoisting into the boat skids. The majority of gasoline fires are due to presence of gasoline and oil in the bilges. Where engine-room bilges are filled with brass-covered balsa wood or cork, frequent inspections should be made to insure that the brass is tight, so that no gasoline can be absorbed by the filling medium.

(*b*) The forward and after engine-space bulkheads should be inspected for tightness in the bilges in order that liquid and gas may be prevented from passing into the adjacent compartments.

(7) *Electric wiring* shall not be permitted in the bilges. Care shall be exercised to reduce sparks to a minimum. Sparks may be caused by a static charge of electricity, short circuits in the electric wiring, grounds, striking steel with hand tools, striking shoe nails on steel, opening and closing switches, etc. The battery box shall be located outside of a closed engine compartment and should be provided with a suitable drip-proof cover. All naked electric terminals shall be wrapped with insulating tape.

(8) *Battery charging.*—Explosions have occurred apparently due to the formation of hydrogen gas while charging boat batteries. This applies particularly to motor boats having their batteries under the seats in the after part of the boat. If the battery is charged (other than from the boat-engine generator) in the boat and allowed to gas, hydrogen may collect under the seats and, if not removed, may be ignited by a spark from the battery caused by a loose terminal or when charging wires are disconnected. Batteries should either be recharged on deck or removed to an open space in the boat until the operation is completed.

(9) *Gasoline piping* shall be extra heavy and joints and seams kept tight. Shellac shall be used in making up joints.

(10) *Cut-out valves.*—Gasoline feed lines shall in all cases be fitted with cut-out valves installed near the fuel tank and so fitted as to be readily accessible to close in emergency. The cut-out valves are to be fitted with extension rods and operating handwheels so located that they may be operated from a convenient location outside of the probable fire-area, *i.e.,* the engine compartment.

(11) *Carburetor drip pans* shall be installed in every motor boat and only an approved type of pan will be permitted which can be removed without any of the contents being spilled into the bilges.

(12) *Tank filling caps* shall be habitually kept in place when not fueling.

(13) *Portable gasoline containers* on combatant vessels shall be stored in the open on weather decks and so located that they can be dumped overboard in emergency. All issues of gasoline shall be made under the supervision of a reliable man, who shall remain in charge until containers are properly secured, see that all safety precautions are carried out, and that all chances of fire are eliminated. The containers shall be inspected after emptying to insure that all gasoline has been drawn off and then closed tight by setting up on the filling and vent plugs. Inspect for leaky containers and, if any are found, immediately transfer the contents either to a boat's tank or to a tight container and clear the one leaking of any vapor present. Defective gaskets and plugs should be replaced. Water shall not ordinarily be introduced into a gasoline drum, but if a leaky container cannot be made tight by setting up on the filling and vent plugs, or repairs are required involving the application of heat, the drum shall first be filled with water, emptied, and blown through with a steam or air jet to eliminate any vapor present. Repairs to gasoline drums or containers are not ordinarily required to be made by the ship's force, as they are repaired at their distribution depots.

OTHER BOATS—HANDLING AND USES

Hospital boats.—The boat with the ambulance party shall carry the medical officer and a large medicine chest containing stimulants and medicines. Each article shall be labeled in English and distinctly marked, with directions for administering and quantity of dose in terms that anyone can understand. The medical officer shall also take a set of surgical instruments, stretchers, and other necessary surgical conveniences.

The hospital boat shall carry no arms whatever and shall fly a Red Cross flag on a staff in the bow.

Artillery boats.—*If gun is to be used in boat only,* the boat shall carry the following:

(1) Boat gun mount, complete, secured to deck plate.

(2) All implements for service of the gun.

(3) Box of accessories and spare parts.

In short, the same supplies should be provided as for the service of the gun on board ship.

If the gun is to be landed, boats shall carry the following:

(1) Field carriage, with all implements for service of the gun; shifting spar, grommet and lashing, and skids or other means for landing the gun.

(2) Haversack for landing armorer's tools; also accessories, spare parts, and all articles necessary for the service of the gun.

If gun is to be used both in the boat and on shore, both the boat mount and the field carriage shall be provided, and accessories, spare parts, etc., as above enumerated.

The equipment of the artillery boat for drill shall be in all respects the same as if the gun were to be fired in battle.

Ammunition shall be carried in the chests in which supplied. The amount will be specified in each case and will depend upon the nature of the service. The following is the minimum amount to be supplied:

3-inch landing gun.—Filled ammunition boxes (24 rounds).

3-inch field gun.—Filled ammunition boxes (32 rounds).

1-pounder, rapid-fire.—Filled ammunition box (60 rounds).

Rifle.—100 rounds for each rifle.

Pistol.—48 rounds for each pistol.

Carrying stores.—(1) When carrying provisions, be careful not to break the oars by letting stores fall on them. Keep all casks "bung up" and leave a space or "well" abaft the after thwart for bailing.

(2) Have tarpaulins for covering bread or anything that will be injured by salt water or rain.

(3) Do not take too heavy a load because of the bad weather you may encounter.

(4) Do not overload with men, as it may result in loss of life. When carrying treasure, always attach a buoy with a drift line at least equal to the greatest depth of water on the route to be taken.

(5) Never put heavy weights in the ends of the boat. Keep the boat on an even keel, and stow the stores so they cannot shift as the boat rolls.

Recreation parties.—In a recreation boat party, the senior line petty officer should act as coxswain. He is responsible for the observance of the following regulations. That

(1) There is no smoking in boats having gasoline engines.

(2) The men do not sit on the gunwale.

(3) All the members are in proper uniform.

(4) All necessary salutes are rendered.

(5) No landing is made and that no one leaves the boat unless permission has been previously given.

(6) All the orders from the officer of the deck are obeyed.

(7) In a sailing party, he makes due allowance for an adverse wind, current, or tide in the distance he sails away from the ship in order that he may return on time.

(8) The boat keeps a sharp lookout for recall from the ship and returns without delay when the same is made.

(9) Every care is taken for the safe navigation of the boat.

(10) The boat returns at the first sign of a storm. If caught in a storm, the coxswain should use his discretion as to whether it is safe to anchor until the storm has passed over or to proceed through it.

(11) No articles are taken aboard prohibited in regulations, such as intoxicating drinks, firearms, etc. Sometimes the latter are allowed by special permission.

(12) The boat and its equipment are not injured through negligence.

(13) Upon the return of the boat, a report is made to the officer of the deck. Any damage to the boat, articles damaged, articles missing, absentees, or other casualties should also be reported to the officer of the deck.

In other recreation parties, such as swimming, athletic, and visiting parties, the man in charge is designated. He is responsible for the behavior of the members and they are under his orders. He is given definite orders for their uniform, time to return, places allowed to be visited, and such other information as necessary.

Handling boats in a surf.—(1) *The most dangerous duty* which a ship's boat is called upon to perform is landing through a surf. This requires greater skill than any other work in an open boat, and the lack of skill or inattention on the part of the coxswain is so likely to result in a loss of life that a novice should never attempt to steer a boat through heavy surf to a beach. The skill necessary to make a successful landing through surf can be obtained only by practical experience gained first as an oarsman and later as a coxswain.

(2) If it is absolutely necessary for an inexperienced crew to land through a surf, the safest method should be adopted, which is to back in, keeping bow to sea, and every time a sea approaches pull to meet it with a good headway, then back in as fast as possible after it passes.

(3) If this is impracticable, a fairly safe method is by towing a heavy drag over the stern.

(4) The great danger in landing through a surf is that of *broaching to*. The breaker lifts the stern, and forces the bow deeply into the water thus making the bow a pivot about which the boat swings broadside to and capsizes. Sometimes, though rarely, a heavy sea gets under the boat, buries her bow, and turns her end over end.

(5) It should always be remembered that surf, when viewed from seaward, is exceedingly deceptive and is always much worse than it appears. On an open seacoast any surf visible from a small boat to seaward would probably be dangerous.

Management of open rowing boats in a surf.—The following rules are published by the Royal National Lifeboat Institution:

Rowing to seaward.—(1) As a general rule, speed must be given to a boat rowing against a heavy surf. Indeed, under some circumstances her safety will depend upon the utmost possible speed being attained on meeting a sea, for if the sea be really heavy, and the wind blowing a hard, on-shore gale, an approaching heavy sea may carry the boat away on its front and turn it broadside on or up-end it. A boat's only chance in such a case is to obtain such a way as shall enable her to pass, end on, through the crest of the sea and leave it as soon as possible behind her. If there be a rather heavy surf, but no wind, or if the wind is offshore and opposed to the surf, as is often the case, a boat might be propelled so rapidly through it that her bow would fall more suddenly and heavily after topping the sea than if her way had been checked.

(2) It may also happen that, by careful management, a boat may be made to avoid the sea, so that each wave may break ahead of her, which may be the only chance of safety in a small boat; but if the shore be flat

and the broken water extend to a great distance from it this will often be impossible.

(3) The following general rules for rowing to seaward may therefore be relied on:

(*a*) If sufficient command can be kept over a boat by the skill of those on board her, avoid the sea if possible, so as not to meet it at the moment of its breaking or curling over.

(*b*) Against a head gale and a heavy surf get all possible speed on a boat on the approach of every sea which cannot be avoided.

(*c*) If more speed can be given to a boat than is sufficient to prevent her from being carried back by a surf, her way may be checked on its approach, which will give her an easier passage over it.

Running before a broken sea, or surf, to the shore (flat beach).—(1) The one great danger, when running before a broken sea, is that of *broaching to*. To that peculiar effect of the sea, so frequently destructive of human life, the utmost attention must be directed. The cause of a boat's broaching to, when running before a broken sea or surf, is that her own motion being in the same direction as that of the sea, she opposes no resistance to it, but is carried before it. Thus, if a boat be running bow on to the shore, and her stern to the sea, the first effect of a surf or roller, on its overtaking her is to throw up the stern, and, as a consequence, to depress the bow; if she then have sufficient inertia (which will be proportional to weight) to allow the sea to pass her, she will in succession pass through the descending, the horizontal, and the ascending positions, as the crest of the wave passes successively her stern, her midships, and her bow, in the reverse order in which the same positions occur in a boat propelled to seaward against a surf. This may be defined as the same mode of running before a broken sea.

(2) But if a boat, on being overtaken by a heavy surf, has not sufficient inertia to allow it to pass her, the first of the three positions alone occurs—her stern is raised high in the air, and the wave carries the boat before it, on its front or unsafe side, the bow deeply immersed in the hollow of the sea, where the water, being stationary, or comparatively so, offers a resistance, while the crest of the sea, having the actual motion which causes it to break, forces onward the rear end of the boat. A boat in this position will sometimes, aided by careful oar steerage, run a considerable distance until the wave has broken and expended itself. But it will often happen that, if the bow be low, it will be driven under water, when, the buoyancy being lost forward, while the sea presses on the stern the boat will be thrown end over end. Or if the bow be high,

or protected by a bow air chamber, so that it does not become submerged, the resistance forward acting on one bow will slightly turn the boat's head, and the force of the surf being transferred to the opposite quarter, she will in a moment be turned broadside to the sea, and be thrown by it on her beam ends, or altogether capsized. It is in this manner that most boats are upset in a surf, especially on flat coasts.

(3) Hence it follows that the management of a boat, when landing through a heavy surf, must stop her progress shoreward at the moment of her being overtaken by a heavy sea and enable it to pass her. There are different ways of effecting this object:

(*a*) By turning a boat's head to the sea before entering the broken water, then backing in stern foremost, pulling a few strokes ahead to meet each heavy sea, and then again backing astern. If a sea be really heavy and a boat small, this plan will be generally safest.

(*b*) If rowing to shore with the stern to seaward, by backing all the oars on the approach of a heavy sea and rowing ahead again as soon as it has passed to the bow of the boat, thus rowing in on the back of the wave; or, as is practical in some lifeboats, placing the after oarsmen with their faces forward, and making them row back at each sea on its approach.

(*c*) If rowed in bow foremost, by towing astern a pig of ballast or large stone, or a large basket, or a canvas bag, termed a "drogue" or drag, made for the purpose, the object of each being to hold the boat's stern back and prevent her being turned broadside to the sea or broaching to.

(4) A boat's sail bent to a yard, loosened and towed astern, the yard being attached to a line capable of being veered, hauled, or let go, will act in some measure as a drag, and will tend much to break the force of the sea immediately astern of the boat.

(5) Heavy weights should be kept out of the extreme ends of a boat, but when rowing before a heavy sea, the best trim is deepest by the stern, which prevents the stern being readily beaten off by the sea.

(6) When running before a sea, a boat should be steered by an oar over the stern or on one quarter.

(7) The following general rules may, therefore, be depended on when running before, or attempting to land through a heavy surf or broken water:

(*a*) As far as possible avoid each sea by placing the boat where the sea will break ahead of her.

(*b*) If the sea be very heavy, or if the boat be small, and especially

if she has a square stern, bring her bow around to seaward and back her in, rowing ahead against each heavy surf sufficiently to allow it to pass the boat.

(*c*) If it be considered safe to proceed to the shore bow foremost, back the oars against each sea on its approach, so as to stop the boat's way through the water as far as possible, and if there is a drag, or any other appliance in the boat which may be used as one, tow it astern to aid in keeping the boat stern-on to the sea, which is the chief object in view.

(*d*) Bring the principal weight in the boat toward the end that is to seaward, but not to the extreme end.

(*e*) If a boat worked by both sails and oars be running under sail for the land through a heavy sea, her crew should, unless the beach be quite steep, take down her masts and sails before entering the broken water, and take her to land under oars alone, as above described. If she have sails only, her sails should be much reduced, a half-lowered foresail or other small headsail being sufficient.

Beaching, or landing through a surf.—(1) The running before a surf or broken sea, and the beaching, or landing of a boat, are two distinct operations; the management of boats, as above recommended, has exclusive reference to running before a surf where the shore is so flat that the broken water extends to some distance from the beach. On a very steep beach the first heavy fall of broken water will be on the beach itself, while on some very flat shores there will be broken water extending 4 or 5 miles from the land. The outermost line of broken water on a flat shore, where the waves break in 3 or 4 fathoms of water, is the heaviest and therefore the most dangerous; and when it has been passed through in safety, the danger lessens as the water shoals, until on nearing the land its force is spent and its power is harmless. As the character of the sea is quite different on steep and flat shores, so is the customary management of boats, on landing, different in the two situations.

(2) *On the flat shore,* whether a boat be rowed or backed in, she is kept straight before, or end-on to the sea, until she is fairly aground, when each surf takes her farther in as it overtakes her, aided by the crew, who will then generally jump out to lighten her, and drag her in by her sides. As above stated, sail will in this case have been previously taken in, if set, and the boat will have been rowed or backed in by the oars alone.

(3) *On the steep beach,* on the other hand, it is the general practice, in a boat of any size, to sail right on to the beach, and in the act of

landing, whether under oars or sail, to turn the boat's bow half around, toward the direction in which the surf is running, so that she may be thrown on her broadside up the beach, where abundance of help is usually at hand to haul her as quickly as possible out of the reach of the sea. In such situations, we believe it is nowhere the practice to back a boat in stern foremost under oars, but to row in under full speed, as above described.

Care and Cleaning of boats.—(1) The coxswain is responsible that his boat and all that belongs to it is kept in good order. He is responsible that his boat davits are clean and is to report if any gear connected with them is not in good order.

(2) Care is necessary to see that the oars are properly coppered, leathered, and marked, that they are of the correct length, and are assigned to the proper thwarts. Care should be taken at all times with the blades of the oars, as they are easily split or broken by rough handling or by stepping on them.

(3) Ensigns, pennants, staves, and trucks demand careful attention; also trailing lines, rowlock lanyards, boat hooks, and the boat equipment.

(4) Coxswains are always to be present when their boats are being lowered, hoisted, or moored.

(5) Immediately after a boat is hoisted, the coxswain is to see her squared by the falls, dried out, boat gear neatly stowed, the outside cleared of all marks, the plug out (except in lifeboats at sea) and secured close to the plug hole with a lanyard. When the ship is at sea, lifeboats will habitually keep their boat plugs in.

Lowering a lifeboat (or other boat) at sea in bad weather (with wind and sea forward of the beam).—At the call *man overboard* (which may be given by word of mouth or sounded on the bugle) every member of the lifeboat crew of the watch goes to his station on the run. The lee lifeboat should be manned. If there is any doubt about which boat is to be lowered, the officer of the deck immediately indicates it by the command *Clear away the starboard (port) lifeboat.* The men take their seats on the thwarts; each man immediately puts on a life jacket, gets his oar ready, and then, if not otherwise engaged, seizes a life line as a safety precaution in case of an accident.

When all is ready, the officer of the deck, or the officer in charge of the lowering, commands *Lower away together.* The bow and stroke oars tend the falls to keep them clear and to keep the blocks from striking other members of the crew when let go. To keep the boat from swinging, frapping lines may be passed around the falls, the ends leading

inboard, to hold the boat close into the side as it is lowered. In some ships jackstays with traveling lizards are fitted from the davit head to the side of the ship. A turn of the lizard is taken under a thwart or around the standing part of the fall, and the boat is held near the side, as by the frapping lines above described. Under no circumstances

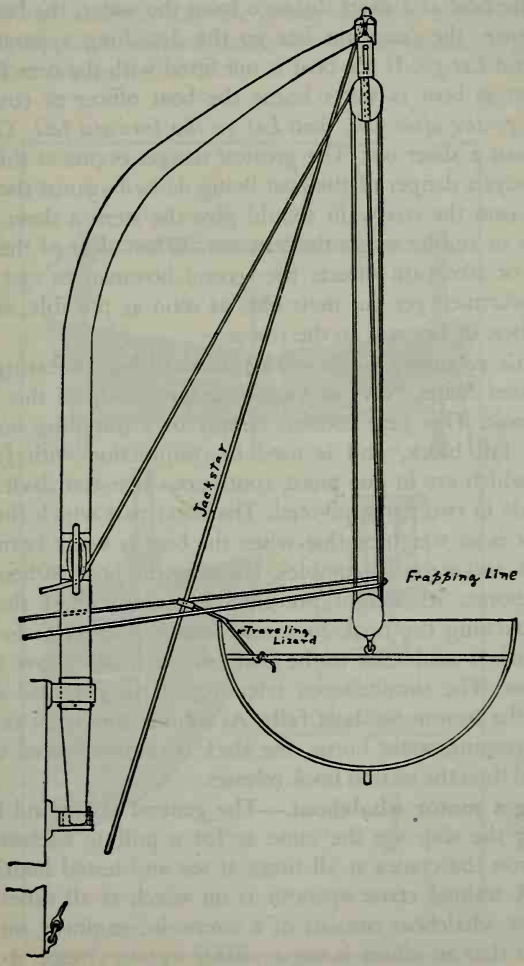


FIG. 45-2—Use of traveling lizard and frapping line.

should the lizard be secured in the boat so that it could jam; the end must be held in the hand (see Fig. 45-2). Some of the men in the waist should breast the boat off the ship's side with the boat hooks, or oars, being careful to hold the butt end above the outer gunwale to avoid danger of the boat being driven against it and its staving a hole in the planking.

When the boat is a short distance from the water, the boat officer or, in his absence, the coxswain lets go the detaching apparatus or gives the command *Let go.* If the boat is not fitted with the detaching apparatus, as soon as boat is water borne the boat officer or coxswain commands *Let go the after fall,* then *Let go the forward fall.* The coxswain gives the boat a sheer out. The greatest danger occurs at this instant, as there is always a danger of the boat being dashed against the ship's side. For that reason the coxswain should give the stern a sheer in with the steering oar or rudder to get the bow out. When clear of the ship's side, the officer or coxswain directs the second bowman to cast off the sea painter, thwartmen get out their oars as soon as possible, and the boat makes the best of her way to the rescue.

Automatic releasing hook.—The standard boat releasing hook used by the United States Navy is known commercially as the "Raymond" releasing hook. This gear consists simply of a tumbling hook on each lower boat fall block, and is used in conjunction with forward and after falls which are in one piece, continuous between davit heads. The hook is made in two parts, pivoted. The outer part which forms the end of the hook is so weighted that when the boat is water borne the point of the hook *automatically* tumbles, releasing the boat. When the boat is not water borne, its weight prevents the tumbling of the hook. To facilitate attaching the hook to a water-borne boat prior to hoisting, a lanyard which is made fast to the point of the hook is rove through the boat shackles. The simultaneous releasing of the fore-and-aft hooks is insured by the continuous boat falls. As soon as one hook is released by the boat becoming water borne, the slack is communicated to the other boat fall and then the second hook releases.

Lowering a motor whaleboat.—The general alarm and the method of handling the ship are the same as for a pulling lifeboat. Power is maintained on the cranes at all times at sea and tested hourly to insure readiness. A trained crane operator is on watch at all times. The crew of the motor whaleboat consists of a coxswain, engineer, and bowman. In the event that an officer is not available to take charge, it is desirable to have an additional man in the boat's crew to handle lines and to hook on.

The boatswain's mate on watch on the upper deck takes charge of lowering until relieved by a chief boatswain's mate or boatswain. The officer of the deck orders the motor whaleboat hoisted out. The crane takes a strain on the falls, gripes are released, the steadying lines manned, the boat hoisted and swung out. The slack of the sea painter is taken in as the boat is swung out. The boat is lowered just clear of the water. When water borne, the steadying lines are released, crane hook tripped, the boat sheered out, and the sea painter released. The boat proceeds to the rescue.

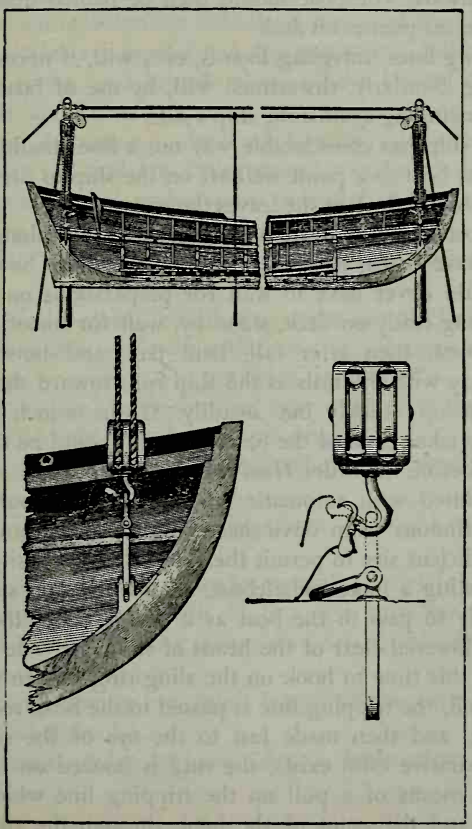


FIG. 45-3—Automatic releasing hooks (courtesy of D. Van Nostrand Company, Inc.).

Hoisting a lifeboat (or other boat) in a seaway.—(1) The same general principles of seamanship apply as in lowering. It is preferable for a ship to have a little headway on in case she is under way. The important point is to keep the boat off the ship's side to prevent its being injured.

(2) The boat comes alongside, a lee having been made for her, and in case of a heavy sea, oil is used freely. *Oars are boated before getting alongside as soon as possible after receiving the sea painter, which should always be passed to her.*

(3) The bowman receives the sea painter and takes a turn around the forward thwart. The boat should then be hauled under the davits by manning the sea painter on deck.

(4) Frapping lines, traveling lizards, etc., will, if necessary, be used as in lowering. Similarly, thwartmen will, by use of boat hooks, keep the boat from swinging against the ship's side.

(5) If the ship has considerable way on, a line should be led from the stern of the boat to a point well aft on the ship to prevent the boat from lurching forward when she leaves the water.

(6) The boat falls should be well overhauled, led along the deck so that the men have a clear hauling space, and they must be well manned. The boat should never have to wait for preparations on deck.

(7) All being ready on deck, stand by, wait for smooth water, hook forward fall first, then after fall, haul taut, and hoist away. Men should run away with the falls as the ship rolls toward the boat, which should be run up quickly but steadily. If the winch is used, the falls should be taken around the barrel, which should be turning at the desired speed before the order *Haul taut* is given.

(8) Boats fitted with automatic releasing hooks should have their falls rove continuous from davit head to davit head, and the blocks must be of sufficient size to permit the falls to render easily.

(9) In hoisting a motor whaleboat, sea painter and steadying lines are made ready to pass to the boat as it comes under the crane. The crane hook is lowered clear of the heads of the crew. The tripping line is again used, this time to hook on the sling ring. When the steadying lines are secured, the tripping line is passed to the boat, reeved through the sling ring, and then made fast to the eye of the safety runner. When a comparative calm exists, the ring is hooked on the crane fall from deck by means of a pull on the tripping line which draws the safety runner and the point of the hook through the ring. The boat engine is stopped and the boat hoisted in.

RULES OF THE ROAD

Rules for preventing collisions.—The regulations for preventing collision of vessels are found in:

(1) *The International Rules,*

(2) *The Inland Rules,* and

(3) *The Pilot Rules.*

The *International Rules* were established by agreement between maritime nations to govern the navigation of vessels on the high seas to prevent collisions.

The *Inland Rules* were enacted by Congress to govern navigation of vessels to prevent collisions in the inland waters of the United States.

The *Pilot Rules* are regulations for preventing collisions upon certain harbors, rivers, and inland waters of the United States and supplement the Inland Rules.

Preliminary definitions.—In the following rules every steam vessel which is under sail and not under steam is to be considered a sailing vessel, and every vessel under steam, whether under sail or not, is to be considered a steam vessel.

The words "steam vessel" shall include any vessel propelled by machinery.

The term "under steam" shall mean under any mechanical power.

A vessel is under way within the meaning of these rules when she is not at anchor, or made fast to the shore, or aground.

The word "visible" in these rules, when applied to lights, shall mean visible on a dark night with a clear atmosphere.

Lights carried by vessels.—1. Steamship under way, bows on. (Art. 2 (*a*), (*b*), and (*c*).)

2. Steamship under way crossing from starboard to port. (Art. 2 (*e*).)

3. Steamship under way not under control. (Art. 4 (*a*).)

4. Steamship towing, length of tow less than 600 feet. (Art. 3, International Rules.) Towing alongside (Art. 3, Inland Rules). Steamship, head on. (Art. 2 (*e*).)

*5. Steamship towing two ships, length of tow over 600 feet. (Art. 3, International Rules.)

6. Steam vessel under 40 tons. (Art. 7, International Rules.)

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* The Inland Rules require 3 white lights in a vertical line when towing one or more vessels astern regardless of the length of the tow.

7. Telegraph ship under way crossing from port to starboard. (Art. 4 (*b*).)

8. Telegraph ship not making way through the water. (Art. 4 (*c*), International Rules.)

9. Sailing vessel, bows on. (Art. 5.)

10. Sailing vessel crossing from starboard to port. (Art. 5.)

11. Steam pilot vessel on duty, bows on under way. (Art. 8.)

12. Steam pilot vessel on duty but not under way. (Art. 8.)

13. Sailing pilot vessel. (Art. 8.)

14. Vessel aground in or near a fairway. (Arts. 4 and 11.)

15. Steam trawler under way, bows on. (Art. 9 (*d*).)

16. Drift-net fishing vessel. (Art. 9 (*b*).)

17. Line fishing vessel, outlying tackle over 150 feet. (Art. 9.)

18. Vessel at anchor over 150 feet long. (Art. 11.)

19. (*a*) Vessel being overtaken (Art. 10); (*b*) vessel at anchor under 150 feet long (Art. 11); (*c*) rowing boats under oars or sails (Art. 7).

20. Sailing trawler, 20 tons and upward. (Art. 9 (*d*), International Rules.)

21. Steam ferryboat crossing from starboard to port.

Lights

Article 1.—The rules concerning lights should be complied with in all weathers from sunset to sunrise, and during such time no other lights which may be mistaken for the prescribed lights shall be exhibited. (Inland and International Rules.)

Steam Vessels—Masthead Lights

Article 2.—A steam vessel when under way shall carry—

(*a*) On or in front of the foremast, or if a vessel without a foremast, then in the fore part of the vessel, a bright white light . . . so fixed as to throw the light 10 points on each side of the vessel, namely, from right ahead to 2 points abaft the beam on either side, and of such a character as to be visible at a distance of at least 5 miles. (Inland and International Rules.)

Steam Vessels—Side Lights

(*b*) On the starboard side a green light . . . so fixed as to throw the light from right ahead to 2 points abaft the beam on the starboard

side, and of such a character as to be visible at a distance of at least 2 miles.

(*c*) On the port side a red light . . . so fixed as to throw the light from right ahead to 2 points abaft the beam on the port side, and of such a character as to be visible at a distance of at least 2 miles.

(*d*) . . . (See Fig. 45-4 (1).) (Inland and International Rules.)

Steam Vessels—Range Lights

(*e*) A sea going steam vessel when under way may carry an additional white light similar in construction to the light mentioned in subdivision (*a*). These two lights shall be so placed in line with the keel that one shall be at least 15 feet higher than the other, and in such a position with reference to each other that the lower light shall be forward of the upper one. . . . (See Fig. 45-4 (1, 2).) (Inland and International Rules.)

Steam Vessels—When Towing

Article 3.—A steam vessel when towing another vessel shall, in addition to her side lights, carry two bright white lights in a vertical line one over the other, not less than 6 feet apart, and when towing more than one vessel shall carry an additional bright white light 6 feet above or below such lights, if the length of the tow measuring from the stern of the towing vessel to the stern of the last vessel towed exceeds 600 feet. . . . (See Fig. 45-4 (4, 5).) (International Rules.)

A steam vessl when towing another vessel or vessels alongside shall, in addition to her side lights, carry two bright white lights in a vertical line, one over the other, not less than 3 feet apart, and when towing one or more vessels astern, regardless of the length of the tow, shall carry an additional bright white light 3 feet above or below such lights. . . . (See Fig. 45-4 (4, 5).) (Inland Rules.)

Article 4.—A vessel which from any accident is not under command shall carry—

(*a*) At the same height as the white light mentioned in Article 2 (*a*), where they can best be seen, and if a steam vessel in lieu of that light, two red lights, in a vertical line one over the other, not less than 6 feet apart, and of such a character as to be visible all around the horizon at a distance of at least 2 miles; and shall by day carry in a vertical line or over the other, not less than 6 feet apart, where they can best be seen, two black balls or shapes, each 2 feet in diameter. (See Fig. 45-4 (3, 14).)

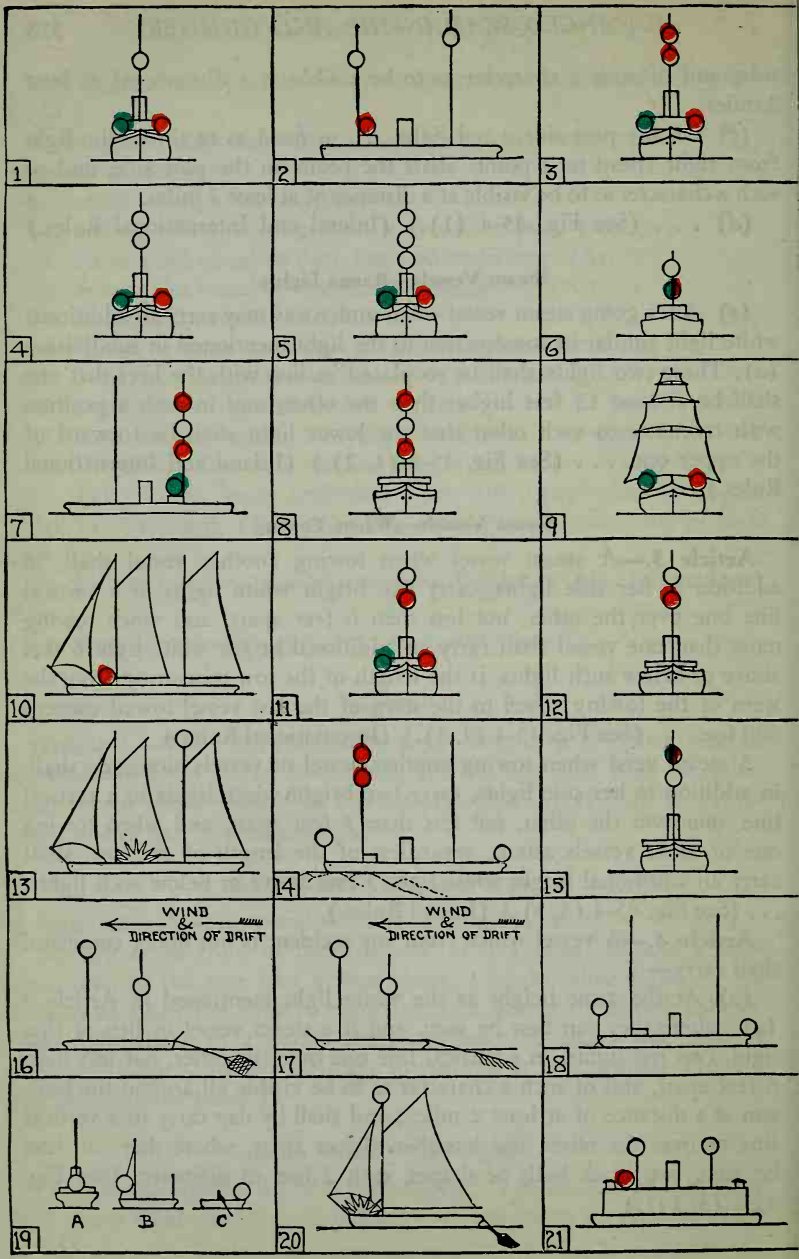


FIG. 45-4—Running lights of vessels.

A vessel employed in laying or in picking up a telegraph cable shall carry—

(*b*) in the same position as the white light mentioned in Article 2 (*a*), and if a steam vessel in lieu of that light, three lights in a vertical line one over the other not less than 6 feet apart. The highest and lowest of these lights shall be red, and the middle light shall be white, and they shall be of such a character as to be visible all around the horizon, at a distance of at least 2 miles. By day she shall carry in a vertical line, one over the other, not less than 6 feet apart, where they can best be seen, three shapes not less than 2 feet in diameter, of which the highest and lowest shall be globular in shape and red in color, and the middle one diamond in shape and white. (See Fig. 45-4 (7, 8).)

(*c*) The vessels referred to in this article, when not making way through the water, shall not carry the side lights, but when making way shall carry them.

(*d*) The lights and shapes required to be shown by this article are to be taken by other vessels as signals that the vessel showing them is not under command and cannot therefore get out of the way.

These signals are not signals of vessels in distress and requiring assistance. Such signals are contained in Article 31. (International Rules.)

Lights for Sailing Vessels and Vessels in Tow

Article 5.—A sailing vessel under way or being towed shall carry the same lights as are prescribed by Article 2 for a steam vessel under way, with the exception of the white lights mentioned therein, which they shall never carry. (Inland and International Rules.)

Lights for Small Vessels

Article 6.—Whenever, as in the case of vessels of less than 10 gross tons under way during bad weather, the green and red side lights cannot be fixed, these lights shall be kept at hand, lighted and ready for use and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such a manner as to make them most visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side, nor, if practicable, more than 2 points abaft the beam on their respective sides. . . . (Inland Rules.)

Article 7.—Rowing boats, whether under oars or sail, shall have ready at hand a lantern showing a white light, which shall be tempo-

rarily exhibited in sufficient time to prevent collision. (See Fig. 45-4 (19C).) (Inland Rules.)

Lights for an Overtaken Vessel

Article 10.—A vessel which is being overtaken by another, except a steam vessel with an after range light showing all around the horizon, shall show from her stern to such last-mentioned vessel a white light or a flare-up light. (See Fig. 45-4 (19A).) (Inland and International Rules.)

Anchor Lights

Article 11.—A vessel under 150 feet in length when at anchor shall carry forward, where it can best be seen, . . . a white light, in a lantern so constructed as to show a clear, uniform, and unbroken light visible all around the horizon at a distance of at least 1 mile.

A vessel of 150 feet or upward in length when at anchor shall carry in the forward part of the vessel, . . . one such light, and at or near the stern of the vessel, and at such a height that it will be no less than 15 feet lower than the forward light, another such light. (See Fig. 45-4 (18, 19B).) (Inland and International Rules.)

Note.—*Ferryboats* carry the side lights and range lights of other steamers except that double-ended ferryboats carry a *central range of white lights* showing all around the horizon and placed at *equal heights* forward and aft, in place of the range lights of other vessels.

In addition to the above, ferryboats may carry a special light, white or colored, on a flagstaff amidships, 15 feet above the white range lights, for the purpose of distinguishing different lines of ferryboats from each other.

Day anchor signal.—Vessels of more than 300 gross tons propelled by machinery when moored or anchored in a fairway or channel where traffic is liable to congestion or confusion shall display, between sunrise and sunset, on the forward part of the vessel where it can best be observed from other vessels, one black ball or shape not less than 2 feet in diameter. (Pilot Rules.)

Sound Signals for Fog, etc.

Article 15.—All signals prescribed by this article for vessels under way shall be given—

1. By "steam vessels" on the whistle or siren.
2. By "sailing vessels" and "vessels towed" on the fog horn.

The words "prolonged blast" used in this article shall mean a blast of from 4 to 6 seconds' duration. . . .

In fog, mist, falling snow, or heavy rainstorms, whether by day or night, the signals described in this article shall be used as follows, namely:

Steam Vessels Under Way

(*a*) A steam vessel under way shall sound, at intervals of not more than 1 minute, a prolonged blast. (Inland Rules.)

(*b*) . . .

Sailing Vessels Under Way

(*c*) A sailing vessel under way shall sound, at intervals of not more than 1 minute when on the starboard tack, one blast; when on the port tack, two blasts in succession; and when with the wind abaft the beam, three blasts in succession.

Vessels at Anchor or Not Under Way

(*d*) A vessel when at anchor shall, at intervals of not more than 1 minute, ring the bell rapidly for about 5 seconds. (Inland and International Rules.)

Vessels Towing or Towed

(*e*) A steam vessel when towing shall, . . . at intervals of not more than 1 minute, sound three blasts in succession, namely, one prolonged blast followed by two short blasts. A vessel towed may give this signal, and she shall not give any other. (Inland Rules.)

(*f*) . . .

Speed in a Fog

Article 16.—Every vessel shall, in a fog, mist, falling snow, or heavy rainstorm, go at a moderate speed, having careful regard to the existing circumstances and conditions.

A steam vessel hearing, apparently forward of her beam, the fog signal of a vessel the position of which is not ascertained shall, so far as the circumstances of the case admit, stop her engines and then navigate with caution until danger of collision is over. (Inland and International Rules.)

Steering and Sailing Rules

Sailing Vessels

Article 17.—When two sailing vessels are approaching one another, so as to involve risk of collision, one of them shall keep out of the way of the other as follows, namely:

(*a*) A vessel which is running free shall keep out of the way of a vessel which is close-hauled.

(*b*) A vessel which is closed-hauled on the port tack shall keep out of the way of a vessel which is close-hauled on the starboard tack.

(*c*) When both are running free, with the wind on different sides, the vessel which has the wind on the port side shall keep out of the way of the other.

(*d*) When both are running free, with the wind on the same side, the vessel which is to the windward shall keep out of the way of the vessel which is to the leeward.

(*e*) A vessel which has the wind aft shall keep out of the way of the other vessel. (Inland and International Rules.)

Steam Vessels

Article 18.—*Rule I.*—When steam vessels are approaching each other head and head—that is, end on, or nearly so—it shall be the duty of each to pass on the port side of the other; and either vessel shall give, as a signal of her intention, one short and distinct blast of her whistle which the other vessel shall answer promptly by a similar blast of her whistle, and thereupon such vessels shall pass on the port side of each other. But if the courses of such vessels are so far on the starboard side of each other as not to be considered as meeting head and head, either vessel shall immediately give two short and distinct blasts of her whistle, which the other vessel shall answer promptly by two similar blasts of her whistle, and they shall pass on the starboard side of each other. (Inland Rules.)

Rule III.—If, when steam vessels are approaching each other, either vessel fails to understand the course or intention of the other, from any cause, the vessel so in doubt shall immediately signify the same by giving several short and rapid blasts, not less than four, of the steam whistle. (Inland Rules.)

Rule V.—Whenever a steam vessel is nearing a short bend or curve in the channel where, for the height of the banks or other cause, a steam vessel approaching from the opposite direction cannot be seen for a distance of half a mile, such steam vessel, when she shall have arrived within half a mile of such curve or bend, shall give a signal by one long blast of the steam whistle, which signal shall be answered by a similar blast given by any approaching steam vessel that may be within hearing. Should such signal be so answered by a steam vessel upon the farther side of such bend, then the usual signals for meeting and passing shall immediately be given and answered. . . .

When steam vessels are moved from their docks or berths, and other boats are liable to pass from any direction toward them, they shall give the same signal as in the case of vessels meeting at a bend but im-

mediately after clearing the berths so as to be fully in sight, they shall be governed by the steering and sailing rules. (Inland Rules.)

Rule VIII.—When steam vessels are running in the same direction and the vessel which is astern shall desire to pass on the right or starboard hand of the vessel ahead, she shall give one short blast of the steam whistle as a signal of such desire; and if the vessel ahead answers with one blast, she shall direct her course to starboard; or if she shall desire to pass on the left or port side of the vessel ahead, she shall give two short blasts of the steam whistle as a signal of such desire; and if the vessel ahead answers with two blasts, shall direct her course to port; or if the vessel ahead does not think it safe for the vessel astern to attempt to pass at that point, she shall immediately signify the same by giving several short and rapid blasts of the steam whistle, not less than four, and under no circumstances shall the vessel astern attempt to pass the vessel ahead until such time as they have reached a point where it can be safely done, when said vessel ahead shall signify her willingness by blowing the proper signals. The vessel ahead shall in no case attempt to cross the bow upon the course of the passing vessel. (Inland Rules.)

Two Steam Vessels Crossing

Article 19.—When two steam vessels are crossing, so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way of the other. (Inland and International Rules.)

Steam Vessels Shall Keep Out of the Way of Sailing Vessels

Article 20.—When a steam vessel and a sailing vessel are proceeding in such directions as to involve risk of collision, the steam vessel shall keep out of the way of the sailing vessel. (Inland and International Rules.)

Course and Speed

Article 21.—Where, by any of these rules, one of the two vessels is to keep out of the way, the other shall keep her course and speed. (See Arts. 27 and 29.) (Inland and International Rules.)

Crossing Ahead

Article 22.—Every vessel which is directed by these rules to keep out of the way of another vessel shall, if the circumstances of the case admit, avoid crossing ahead of the other. (Inland and International Rules.)

Steam Vessel Shall Slacken Speed or Stop

Article 23.—Every steam vessel which is directed by these rules to keep out of the way of another vessel shall, on approaching her, if necessary, slacken her speed or stop or reverse. (Inland and International Rules.)

Overtaking Vessels

Article 24.—Notwithstanding anything contained in these rules, every vessel overtaking any other shall keep out of the way of the overtaken vessel. (Inland and International Rules.)

Narrow Channels

Article 25.—In narrow channels every steam vessel shall, when it is safe and practicable, keep to the side of the fairway or mid-channel, which lies on the starboard side of such vessel. (Inland and International Rules.)

Right of Way of Fishing Vessels

Article 26.—Sailing vessels under way shall keep out of the way of sailing vessels or boats fishing with nets or lines or trawls. This rule shall not give to any vessel or boat engaged in fishing the right of obstructing a fairway used by vessels other than fishing vessels or boats. (Inland and International Rules.)

General Prudential Rule

Article 27.—*In obeying and construing these rules, due regard shall be had to all dangers of navigation and collision and to any special circumstances which may render a departure from the above rules necessary in order to avoid immediate danger.* (Inland and International Rules.)

Sound Signals for Passing Steamers (See Art. 18)

Article 28.—When vessels are in sight of one another a steam vessel under way whose engines are going full speed astern shall indicate that fact by three short blasts on the whistle. (Inland Rules.)

Precautions

Article 29.—Nothing in these rules shall exonerate any vessel, or the owner or master or crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper lookout, or of neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case. (Inland and International Rules.)

Distress Signals

Article 31.—When a vessel is in distress and requires assistance from other vessels or from the shore the following shall be the signals to be used or displayed by her, either together or separately, namely:

In the daytime.—A continuous sounding with any fog-signal apparatus, or firing a gun.

At night.—(1) Flames on the vessel as from a burning tar barrel, oil barrel, etc. (2) A continuous sounding with any fog-signal apparatus, or firing a gun.

Note.—Another international day distress signal is NC, or a square flag having a ball above or below it. At night rockets fired at short intervals is also a distress signal in the international rules.

TIDES

Every coxswain and boatswain's mate handling boats or anchor gear should have a knowledge of the tides, where they occur, and how they are named.

Tides are closely related to the passage of the moon over the meridian and are caused by the attraction exerted by the moon and by the sun on the waters of the earth. Tides are a rise and fall of the water; tidal currents are the flowing of the water in or out of a place. The greatest height to which the tide rises is called high water; the lowest level to which it falls is called low water; that moment at either high or low water when no vertical movement takes place is called "stand," and the difference in height between low and high water is called "range."

Ebb tide.—When the tide is running out.

Flood tide.—When the tide is setting in.

Slack water.—When the water has no motion due to tide. In open bays it usually occurs near the time of either high or low water, but in narrow entrances flood tide often continues for several hours after the time of high water.

Springtides.—The tides just after the new and full moon. The range of the tide is then greatest. The high water is higher and the low water is lower than at any other time.

Neap tides.—They occur when the moon is near the first and third quarters. The range at this time is the least. The high water is not as high nor is the low as low as at other times during the moon's phases.

In most harbors there are many swirls and eddies which should be learned. The tide is stronger in the center of a current than near the edges, and when a boat has to oppose the tide more progress can be made near the edge of the current.

BUOYS

Uniform system of buoyage in United States waters.—(1) In coming from seaward, red buoys mark the starboard or right-hand side of the channel, and black buoys the port or left side.

Note.—A convenient method of remembering this is *red, right, returning.* Red buoys are on the right when returning from sea.

(2) Dangers and obstructions which may be passed on either side are marked by buoys with black and red horizontal stripes and may be left on either hand.

(3) Buoys indicating the fairway are marked with black and white vertical stripes and should be passed close to.

(4) Sunken wrecks are marked by the red and black obstruction buoys described in (2). In foreign countries green buoys are frequently used to mark sunken wrecks.

(5) Quarantine buoys are yellow.

(6) As white buoys have no special significance, they are frequently used for special purposes not connected with navigation.

(7) The starboard and port buoys are numbered from the seaward end of the channel, the black bearing the odd and the red the even numbers.

(8) Perches with balls, cages, etc., will, when placed on buoys, be at turning points, the color and number indicating on which side they shall be passed.

STORM WARNING SIGNALS

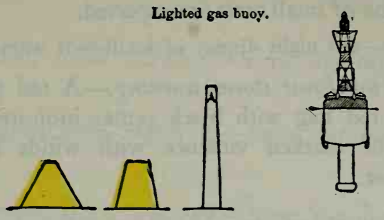
In the United States the system of weather signals is very complete, information of the approach of storms being received from various stations in the United States and even throughout the West Indies. These warnings are published at the various seaports by the display of flags by day and lanterns at night.

The United States uses the signals described here.

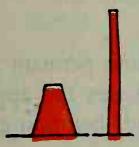
Day

The United States has not adopted the International Storm Signals but uses signals described here.

SYSTEM OF BUOYAGE IN UNITED STATES WATERS



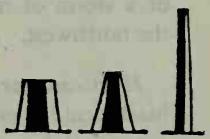
MISCELLANEOUS BUOYS



STARBOARD HAND

PORT HAND

ISOLATED DANGER



MID-CHANNEL OR FAIRWAY

WRECK

Lighted, whistle, bell, or gong buoys, or any of above, excepting the miscellaneous, or the black and white (PS) buoys may be used to mark wrecks, the coloring indicating how to be passed.

REMARKS

The colors and numbering of buoys are fixed by law.

Lighted, whistle, bell or gong buoys are colored as above, excepting under heading "Miscellaneous Buoys"

Lighted buoys may show fixed, flashing, or occulting lights, white, red, or green, and may have a whistle, bell, or gong.

Red lights are not used on black buoys excepting rarely.

Day beacons are constructed and distinguished with special reference to each locality, and particularly with regard to the background upon which projected. Beacons on the sides of channels, when practicable, are colored to conform to the coloring of buoys, subject to the above condition as to background.

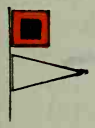
FIG. 45-5.

A small-craft warning.—A red pennant indicates that moderately strong winds that will interfere with the safe operation of small craft are expected.

Note.—No night display of small-craft warnings is made.

The northeast storm warning.—A red pennant above a square red flag with black center indicates approach of a storm of marked violence with winds beginning from northeast.

The southeast storm warning.—A red pennant below a square red flag with black center indicates the approach of a storm of marked violence with winds beginning from the southeast.



The southwest storm warning.—A white pennant below a square red flag with black center indicates the approach of a storm of marked violence with winds beginning from the southwest.

The northwest storm warning.—A white pennant above a square red flag with black center indicates the approach of a storm of marked violence with winds beginning from the northwest.

Hurricane or whole gale.—Two square flags, red with black centers, one above the other, indicate the approach of a tropical hurricane or of one of the extremely severe or dangerous storms which occasionally move across the Great Lakes and northern Atlantic coast.

FIG. 45-6

Red flag with black center indicates that a storm of marked violence is expected; *red and white pennants* displayed indicate the direction of the wind—red, easterly (from east to south); white, westerly (from southwest to north.) The *pennant above the flag* indicates that the wind is expected to blow from the northerly quadrant; *below,* from the southerly quadrant.

Note.—*Northwest and southwest* signals as above indicate that storm center has passed. *Northeast and southeast* signals indicate that storm center is approaching.

Night

Northeast storm warning.—Same significance as day signal.

Southeast storm warning.—Same significance as day signal.

Southwest storm warning.—Same significance as day signal.

Northwest storm warning.—Same significance as day signal.

Hurricane or whole gale wind.—Same significance as day signal.

FIG. 45-7.

Duration of signals.—Signals remain displayed for 24 hours from the time specified in the order to hoist, change, or to continue them no longer unless a subsequent telegram is sent out ordering them down.

Radio weather reports are also broadcast daily by certain naval radio stations.

CHAPTER 46

A SECTION, A WATCH AT SEA, C. & R. SOUNDINGS

The section at quarters.—The section leading petty officer will note that his position is on the right of the front rank of his section.

Other petty officers take post in the front rank of their own sections from right to left in order of seniority.

The seamen, first class, occupy the remainder of the front rank, and all other nonrated men are in the rear rank.

Petty officers in charge of sections will see that their sections fall in at quarters in this manner.

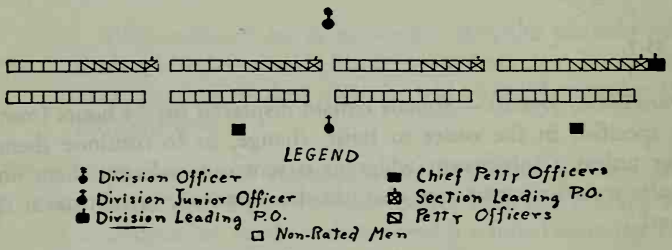


FIG. 46-1—Division at quarters.

Looking (Fig. 46-1) from *right* to *left,* the sections are numbered as follows: first section, third section, second section, fourth section.

The first and third sections are in the starboard watch; the second and fourth sections are in the port watch.

Quarters, or muster, is a necessary part of the military routine on a man-of-war. Men at quarters are in a military formation. At the command *Attention!* men must stand at attention. There is no halfway method of doing this and you, as a petty officer and as a section leader, must see that the section stands properly. The purpose of quarters is to muster the men and to sight them at least once a day. It furnishes the division officer an opportunity to inspect for cleanliness of person and clothing. The practice of hiding out unusually dirty men from the eyes of the officers is entirely wrong, as the purpose of an inspection is not to see how clean men are, but to find out what men require attention. Boatswain's mates can do a great deal toward making quarters satisfactory to the division officer. Give your men sufficient time to clean up;

then see that they are clean. An active boatswain's mate leaves little for the division officer to do in this respect. Many excuses are offered for not coming to quarters, but petty officers must not excuse men without permission from the division officer. Finally, being a party to a false muster is a very serious military offense.

To form the division.—At *assembly* the division leading petty officer, in front of and facing the center of the division, commands *FALL IN.* Each section leader then has his section fall in as prescribed above.

The division leading petty officer then commands *MUSTER THE SECTIONS.* At this command each section leader takes one step to the front, faces to the left, and musters his section. Each faces to the front when the muster is completed.

The division leading petty officer then commands *Section Leaders to the Front and Center.* At this command the section leaders face toward the center. At the command *MARCH,* the section leaders march to the center and face to the front.

The division leading petty officer then commands *REPORT,* and the section leaders report in succession from right to left. Section leaders do not salute the division leading petty officer.

The division leading petty officer then commands *Post,* at which the first and third section leaders face to the right, the second section leader faces about, and the fourth section leader faces to the left. At the command *MARCH,* each section leader takes his post on the right of the front rank of his own section.

The section leaders remain in their positions for inspections.

Duties of a section leader.—The section leader, under the division leading petty officer, has full charge of his section and the part of the ship assigned his section. He supervises all the work required of his section and is responsible that all work is carried on properly. He is accountable for the neatness, cleanliness, and upkeep of his part of the ship. He is especially responsible that all title-B equipage and all other equipment in his part of the ship is accounted for at all times and is always ready for use. He selects, with the approval of the division leading petty officer and the division officer, all men from his section for special details, etc. He must be particularly careful not to show any favoritism or partiality in these selections, and should divide the men in his section in such manner that all these details will be assigned equally to all men. He must understand what details his section has to furnish for watches at sea and must arrange his men so that these watches are equally distributed among them. It is his duty to see that

every man in his section thoroughly understands the duties required of him on watch. Before sending any man to his watch station, he must satisfy himself that the man is thoroughly competent to perform his duties. When a call is made for working parties, etc., he must furnish his men promptly. A good section leader is a leader of men who can direct and teach them in their work in such a way that it will be interesting instead of monotonous. He must be able to instruct the men under him in all duties of their rating. The section leader is marked on the manner in which he handles his section, the efficiency of his section, the condition of his part of the ship, and the leadership he displays.

Any section whose men are unmilitary in bearing, slow in obeying orders, noisy at drills, slouchy or untidy at quarters, etc., is an inefficient section: someone is strictly accountable, and the section leader is very likely to be at fault. A section leader must remember that his section will look to him for guidance and example.

Handling a section in port.—The section leader must be first in everything. At reveille he should be up at the first call and see that his section turns out promptly. He sees that the hammocks of his section are properly lashed and stowed and that coffee is ready for the men. He finds out what the morning orders contain from his division leading petty officer and gives proper instructions to his men for carrying out these orders. Before wetting down, he sees that all deck gear is clear of the decks and the decks swept down. If clothes, hammocks, bags, mattress covers, or blankets are to be scrubbed, he sees that all men in his section turn to on them at once and that they are stopped on the lines properly. If hose, canvas, or bright woodwork are to be scrubbed, he sees that his men break out these articles promptly. He superintends all cleaning, teaches his men how to scrub decks, paint work, etc., and sees that all parts are thoroughly cleaned. After drying down with squilgees, all wet places on deck and the waterways are dried down with swabs and cleaning gear is neatly replaced. He sees all wet hose, swabs, etc., triced up or laid out in the proper place for drying. He must especially teach his men how to clean properly without ruining the paint work, hose, or other gear, or causing unnecessary waste. He inspects his compartments below decks as often as necessary to see that they are properly cleaned.

The section leader may be a mess captain; if so, he should inspect to see that his tables, mess gear, etc., are clean. He sees that his messmen are clean and that they serve the food promptly and properly.

After breakfast he sees that all his men shift into the uniform of the day. He inspects the men going on special duty as messengers, side boys.

etc., and satisfies himself that they are in all respects ready for duty.

At *turn to* he sees that his men start promptly on their bright work. Before the men finish he inspects all bright work and sees that all stains of bright-work polish on paint work, etc., are removed. He sees all his compartments and decks cleaned up for quarters.

At quarters he sees that all his men are clean and in clean clothes. The division officer holds him partly responsible for the condition of all his men. Systematic inspection of the men in ranks and following up those who do not pass satisfactory inspection to make them clean up are important duties of the section leader.

The section leader will take care to see that the afternoon drill and ship's work are carried on properly. He should inspect all his compartments below decks to see that the water-tight doors, fire hose, etc., are in proper condition. A water-tight door is in proper condition when the gaskets are clean, the gasket strips in proper place with all screws in, all dogs working and set to push the door firmly against the knife-edges, and the knife-edges bright and free from paint. All fire hose with nozzles and spanner wrenches must be in their places, and the hose and nozzles must be supplied with gaskets. All air ports should have their dogs and gaskets free of paint. All title-B equipment and other equipment must be in its place.

The section leader will see that his liberty list is made out in time and turned over to the division leading petty officer. If some of his men should want special liberty, and their reasons are good and their services can be spared, he should take their case to the division leading petty officer. He must arrange his liberty lists or make necessary arrangements so that the work in his section is properly carried out during the time that his men are ashore.

He must notify the men who are to have the anchor watch and see that they know their duties, where they are to muster, and where they are to sleep. At hammocks he sees that his men go promptly to their nettings, fall in facing aft in two rows, and get their hammocks when the call is piped. He instructs his men concerning ship regulations and *Navy Regulations,* and is responsible that the men comply with these regulations while under his control; he is always responsible for carrying out police regulations among men in his vicinity if they are of lower rating than he holds.

Working parties and watches.—It is unfair to give any man or men more than their share of watches or working-party details. You may not like certain men and are in a position to make it hard for them.

Playing favorites never pays in the long run. It is up to every man to do his share of the work at hand and it is your job to see that your section does its share. To give extra work or watches to men for personal reasons is forbidden by both reason and regulations. To accomplish results as a section leader you must be fair and square with every man in your section. That is one of the major principles of leadership. You are a leader, so follow the principles of leadership.

Complaints.—When a man has a complaint he may bring it to you. Investigate it to be sure it is not the result of some fancied wrong. If it is a real complaint do what you can to correct the trouble. If you are unable to do what is necessary or do not know what to do see your division officer about it. It is much better to meet each issue as it arises than to have your men dissatisfied because conditions are not what they think are right.

Watch quarter and station bill.—Each man's station and duties at all drills are given in the watch quarter and station bill. It is customary to assign cleaning stations in accordance with this bill. You must check up to see that each man in your section not only knows where he goes at all drills but also thoroughly understands just what his duties are. Constantly oversee the cleaning and upkeep work done by your section. You must show the recruits just how to sweep, scrub, shine bright work, etc. It is not sufficient to tell a man to shine a certain piece of bright work, for example. You must show him how, if he does not know; then see that he does it right and without wasting time.

A job is never finished until everything is cleaned up in the vicinity of the job and the tools and gear used put away in their proper places. It is very important to see that men clean up after themselves. You must see that all your men thoroughly understand this principle and check up constantly to see that it is done. Also, if some one from another part of the ship comes to your part of the ship to make repairs, you must insist that all dirt is swept up and the place shipshape before the job is completed. When stores are brought aboard, it is necessary to clean up the dirt immediately the stores are aboard and stowed. Do not wait until the first lieutenant or boatswain calls your attention to the untidy condition of your part of the ship, or until the next time sweepers are piped. Clean up as part of the job, and don't consider the job done until the incidental cleaning is done. You cannot place too much emphasis on this when instructing your section.

The morning watch in port is the busiest watch of the day. The officer of the deck has an exacting schedule of work before him, and

is dependent to a large degree upon the co-operation and assistance of the boatswain's mates. If things do not move, boats are late and a train of trouble follows. The officer of the deck has a morning order book in which the executive officer has set down those things which he desires to have done. Many of these items are not of interest to the boatswain's mates, but items relating to the cleaning of the ship, working parties, hoisting out boats, and the like must be carried out by the boatswain's mates, who should report to the officer of the deck at least 10 minutes before *turn to* in order to receive their orders.

The routine differs for each day of the week, but is usually the same for the same day of any week. Promptly at *turn to,* the work should be started, and at this time the boatswain's mate can best devote his time to checking up his men to see that they are on the job. Lay up all gear clear of the decks, break out wash-deck hose, buckets, sand, squilgees, and the like, and see that pressure is on the fire mains for washing down. When leads of hose are not in use, turn them off for the time being so that a better stream of water can be had where needed. On the quarter-deck, see that the men do not make unnecessary noise pounding their brushes and squilgees on the deck. Too much time is usually spent on the decks, and the whole operation dragged out. Decks should be scrubbed and washed down in 45 minutes.

If there are boats to be hoisted out, a little foresight will prevent the common causes for delay. Some of the reasons (they are not excuses) for delay are: *No power in the crane, Can't find the engineer,* etc. Nothing pleases an officer of the deck more than to have his boats ready when wanted, and it is not necessary to add that he is equally vexed at the delay.

The best time for fueling boats is in the morning watch, as the boats cannot be spared later in the day for fueling. Gasoline for motor boats is furnished either from a large storage tank by a hose over the side or from 50-gallon drums. The drums on large ships are carried on a coaling truck to the part of the deck handiest to the boat. A special fueling hose is used. There should be a second valve near the filling end of the hose so that fuel can be cut off when the tank is filled without losing the gasoline in the hose. It is no longer required that empty drums be filled with water. The empty drums should be well drained of gasoline, tightly closed, and stowed separately. All gasoline drums should be handled carefully so that they will not be damaged and caused to leak.

If working parties are to leave the ship, have the men ready. If one

or two men of a large working party are absent, do not wait for them. Working parties should be equipped with lines, whips, and tarpaulins. Boats sent for frozen supplies should always be equipped with tarpaulins, and those men who are to be sent into the cold-storage holds should wear heavy underwear and blue clothing.

All boats sent for supplies should be equipped with cargo nets. The last two loads can be left in the nets in the boat ready for unloading.

If airing bedding, see that the hammocks get on deck and supervise their disposition along the rail so that holidays will not cause waste space. This is an excellent time to inspect the bedding for cleanliness. If you find dirty blankets, direct the owner to scrub them.

Canvas should always be scrubbed with sand, but sand should not be used on fire hose, as it wears it out rapidly.

It is usual to allow the men half an hour to scrub clothes after *turn to,* and only after the decks are wet down, so as to prevent soap sticking to the deck.

If breakfast is at 0730, make every effort to have the decks dried down by 0700. Do not forget to relieve the boat keepers for breakfast; and if a life-buoy watch is posted, to relieve him as well. At this time detail the side boys and see that they report in proper uniform.

Boatswain's mates in charge of compartments should see that the mess cooks are up and active, and that compartment cleaners are at work. Men who have had night watches and are allowed late hammocks should be roused out at 0700 and made to get their hammocks clear of the deck so that mess tables can be set up.

Handling a section at sea.—The section leader musters his section prior to each watch and reports his section to the boatswain's mate of the watch. He then gives such instructions as are necessary to his men as to what watches they will stand, where they are to stay when not on watch, etc. He then sees that his men take their stations as soon as the word is passed to *relieve the wheel and lookouts* and reports to the boatswain's mate of the watch when this has been done.

The section leader must remember that the officer of the deck holds the boatswain's mate of the watch responsible for relieving the various stations, and that the men on these stations know their duties, and that the boatswain's mate of the watch is going to hold the section leader responsible for his own men. During night watches, especially, it is important that the section leader be alert and that he keeps his men together where he can get them quickly in an emergency. When the boatswain's mate of the watch passes the word for any work to be

done, the section leader will see that his men carry out the order promptly.

If the section leader is the coxswain of the lifeboat, he must be especially alert. He must see that his boat's crew is dressed and ready to man the boat at a moment's notice. He may let the men sleep on deck provided someone is detailed to keep awake and to call them when necessary. All of the boat crew and men detailed for lowering must be together. When the boat crew is mustered, the section leader will see that the men muster abreast their thwarts and the men detailed for lowering muster at their davits. At the first muster after 2000, each man should be told to state his duties at both lowering and hoisting. The section leader reports the lifeboat crew mustered and boat ready for lowering direct to the officer of the deck.

Section leaders will take care that all work and watches are distributed evenly to the men of their sections.

At setting-up drill the section leader will take a station where he can best note the performance of his men. Ordinarily section leaders will take part in these exercises, but he should not hesitate to stop and correct errors on the part of his men. At the first opportunity he should get the men who are deficient in this drill and teach them the proper procedure.

If the drill is one where clothes may be soiled or spotted with grease, he should warn his men to have an old suit ready to put on immediately after quarters. When drill call sounds, he will require his men to go to their stations quietly on the double. He should be an example to them in this respect. Where the drill requires apparatus, as rifles for infantry drill, ropes for knotting and splicing drill, etc., he should see that this is provided at division quarters prior to the drill periods. The division officer should never have to delay a drill for lack of the apparatus necessary.

After drill, if he has no ship's work requiring old clothes, he should see that his men get into clean uniforms. The section leader must organize his ship's work so that all will be done properly and according to a set routine. He should have a schedule of overhaul for all the davits, turnbuckles, blocks, boats, boat gear, equipment, etc., in his part of the ship so that none will be forgotten and all will work properly when needed. Frozen davits, frozen turnbuckles or blocks are a sign of a disorganized section and an inefficient section leader.

Method of taking C. & R. soundings.—Sounding tubes are fitted from one of the upper decks to a low point in trimming tanks, main

compartments of the hold, peak tanks, and certain double-bottom compartments, as well as to certain other compartments and tanks (fuel and Diesel oil tanks) which are under supervision of engineering personnel. On board ship the ones not under supervision of the engineer officer are sounded according to a set routine and the results of these soundings, called the C. & R. soundings, are immediately reported to the officer of the deck. The reports are made at 2000 in port; under way on large vessels the soundings are *reported every hour from 2000 to 0800*, and on smaller vessels ordinarily every 2 or 4 hours according to ship regulations.

On small vessels coxswains are required to know where the sounding tubes are located and how to take the soundings. Sounding tubes usually end in a flush plate fastened to the deck; the hole in the plate is closed with a water-tight cap screwed in; the plate is marked with the number of the compartment of which the sounding is taken. In some cases the sounding tube extends 2 or 3 feet above the deck to prevent slopping of oil when the ship rolls. The sounding rule rod is made of jointed pieces of metal at least 2 feet long, and is marked off in inches. A chain or line is fastened to the top by which the rule may be lowered into the tube. Before each sounding the rule should be dried off and chalked; then the rule is lowered in the tube until it touches bottom and immediately drawn up again. If the ship is rolling it should be lowered and hoisted rapidly when the ship is temporarily on an even keel.

Presence of water and the depth of the sounding show clearly on a chalked rule; sounding and compartment number should be written down at once to avoid mistakes, and unless there seems to be an emergency the soundings should be reported at the routine hour.

CHAPTER 47

MARLINESPIKE SEAMANSHIP

WIRE ROPE

WIRE ROPE has much in common with fiber rope which has been discussed in a previous chapter. The terms used to describe its manipulation are practically the same as for fiber rope and are not defined here for that reason. One essential difference is that no knots can be tied in wire rope, making it necessary to employ different methods of securing it.

Wire rope is manufactured from a variety of materials and in many patterns, dependent upon which of many purposes it is to be put. Its characteristics vary greatly with the material from which it is manufactured, the size and number of wires used, and the pattern in which it is made up.

Navy Department specifications provide for wire rope of the following materials and strengths:

Minimum tensile strength (lb. per sq. in.)

Material	Not Galvanized	Galvanized
Cast steel	170,000	155,000
Extra strong cast steel	190,000	170,000
Plow steel	210,000	190,000
High grade plow steel	230,000	210,000
Phosphor bronze	90,000	

Wire rope is also made of corrosion-resisting steel, and of special steel having 280,000 lb. per sq. in. tensile strength. The latter is used for long towing lines where both adequate strength and light weight are required. Wire rope is used in the Navy for rigging, towing, pendants, crane falls, wheel ropes on small ships, etc.

Wires are laid up to form strands, and strands are laid up to form rope or cable. Wire rope is usually 6-strand, with a variable number of wires in each strand. In general, for a given diameter of strand, small diameter wires give flexibility whereas larger wires stand abrasion better. For this reason some patterns provide strands of larger diameter wires on the outside of the strand to take the wear, and smaller wires within to give flexibility.

Wire rope is customarily laid about a fiber core, as hemp, which has the threefold purpose of increasing flexibility, acting as a cushion to reduce the effects of sudden strain, and serving as a reservoir for the oil necessary for lubricating the wires and strands to reduce friction between them.

Wire rope may be wormed, parceled, and served, similarly to fiber rope. A coat of red lead is usually applied to wire rope after it has been wormed, and it is parceled while still wet, or the side of the canvas going next to the wire may be red-leaded.

Fiber-clad wire rope is manufactured, each strand being served with tarred-hemp marline. It is about three times as strong as Manila rope of equal diameter, and is only slightly less flexible. *Armored wire rope* is rope in which each strand is wrapped spirally with flat strips of steel.

Wire rope may be either of wires galvanized (coated with zinc) or ungalvanized. The galvanized rope withstands the weather better, but the coating is of no value for ropes constantly running over sheaves as the coating soon flakes off because of the flexing of the rope in operation. Hot galvanizing reduces the strength about 10 per cent. When resistance to corrosion must be had in addition to strength, the running rope is often made of material which is itself corrosion resisting and requires no zinc coating.

Wire strands are twisted around the core or center, either to the right or to the left, and the resulting rope is thereby designated as *right lay* or *left lay*.

There are two general methods of laying up wire rope, the common type known as regular lay and the other as Lang lay. In regular lay the wires of the strands are twisted in one direction and the strands in the opposite direction. As most of the rope used in the Navy is regular lay, manipulation of regular lay is discussed in this chapter to the exclusion of other lays. It may be noted however that in Lang lay the wires in the strands and the strands in the rope are all twisted in the same direction.

The size of wire rope is designated by its diameter in inches across the widest part. From force of habit, it is often designated by circumference, as in fiber rope, but this should not be confusing as it can usually be told what size is meant. The ratio of circumference to diameter is about 3 to 1, *i.e.*, a 1-inch wire rope would be about the same size as a 3-inch fiber rope.

It is also classed by standard types into 6 x 12, 6 x 19, 6 x 24, and 6 x 27. The "6" indicates the number of strands and the other figure

indicates the number of wires in each strand. A 6 x 12 wire rope would have 6 strands with 12 wires in each strand, and would thus be made up of 72 wires.

The length of wire rope is measured in fathoms, as is fiber rope. The specifications for wire rope show its pattern, diameter in inches, approximate circumference, weight in pounds per fathom, average breaking strength, and maximum safe working load.

To measure accurately the diameter of wire rope, it should be measured at three places at least 5 feet apart with a suitable device such as a machinist's caliper square (Fig. 47-1). The average of these diameters is the diameter of the rope.

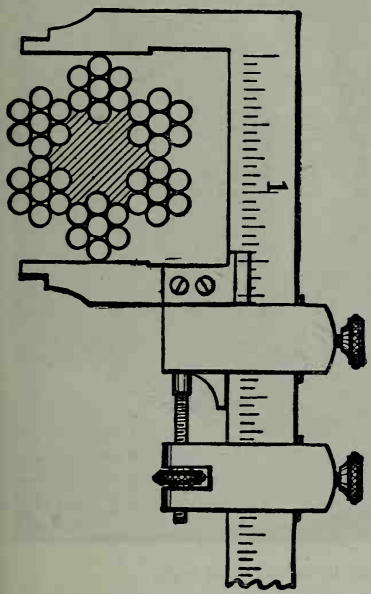
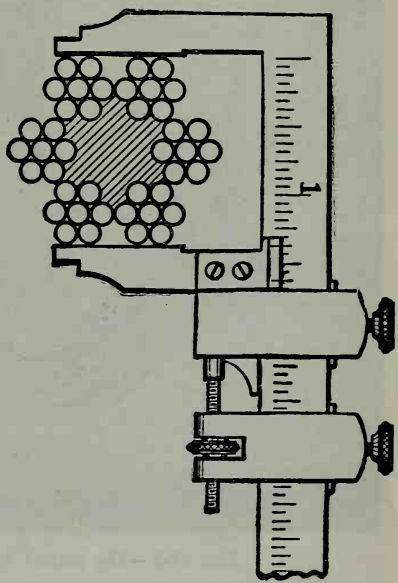


FIG. 47-1—Correct way to measure the diameter of wire rope. Use a machinist's caliper square.



Incorrect way to measure the diameter of wire rope.

Care of wire rope.—Wire rope, if anything, requires better care than fiber rope.

A kink will ruin the best wire rope. For this reason it should always be stowed on reels; it should be unreeled and not removed from a reel

in bights; turns should never be allowed to overlap on a drum or winch; it should not be run over pulleys in such a way that it will have a reverse bend, like the letter "S," and it should never have sharper bends than can possibly be avoided, in any type of use. Kinks are easily seen and are a warning of the probable weakness of a wire rope.

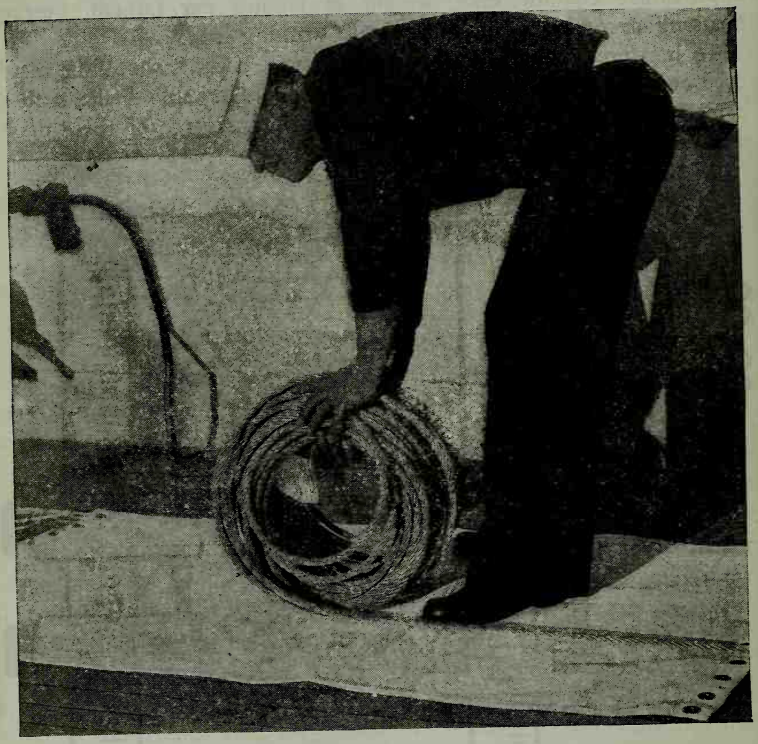


FIG. 47-2—The correct way to uncoil wire rope.

When wire rope is used with sheaves, the diameter of the sheave and speed of running are important. Large sheaves and low speeds are best. In any case, the diameter of the sheave should never be less than 20 times as great as that of the rope in use, but the score of the sheave should not be so large as to allow excessive play. The wear on a wire rope running over a pulley increases more with the speed than it does with the load, hence it is better to increase the load of each hoist

rather than the speed of the crane or winch when we are in a hurry.

Wire rope should be thoroughly lubricated frequently with linseed oil, if in use, or with crude oil mixed with lampblack. The lubricant must be thin enough to reach the interior and prevent excessive friction inside.

Wire rope should be wrapped with canvas, leather, or other chafing

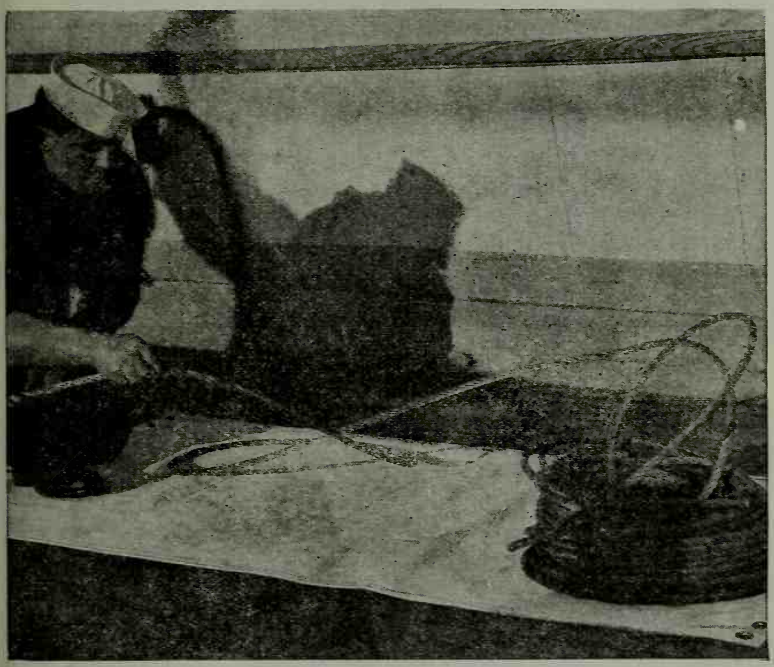


FIG. 47-3—The wrong way to uncoil wire rope.

gear, where it passes through a chock or any other point that would wear it by rubbing.

Wire rope should not be used when the outside wires are worn down to half their original diameter, where there are numerous broken wires, or where there are any other indications that it has been kinked or subjected to excessive strain. Otherwise, wire almost never fails if used within its proper working limits.

Care of the rigging.—Wire rigging is protected by being galvanized

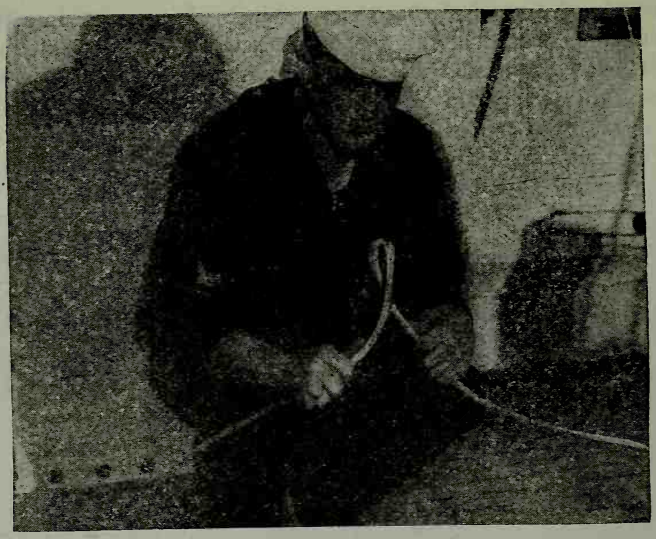


FIG. 47-4—The correct way to take a kink out of wire rope, first step.

FIG. 47-5—The correct way to take a kink out of wire rope, second step.

FIG. 47-6—The correct way to take a kink out of wire rope, third step.

FIG. 47-7—The correct way to take a kink out of wire rope, fourth step.

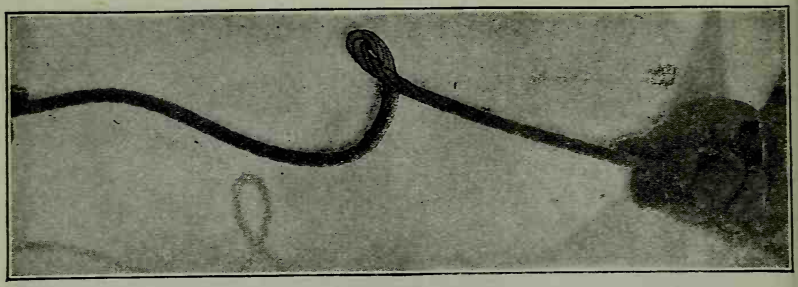


FIG. 47-8—The wrong way to take a kink out of wire rope, first mistake.

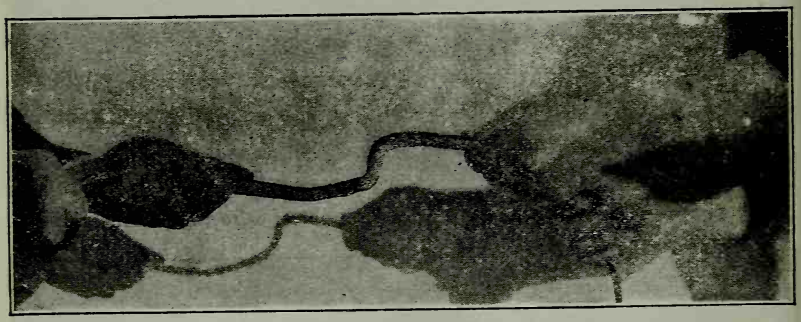


FIG. 47-9—The wrong way to take a kink out of wire rope, second mistake.

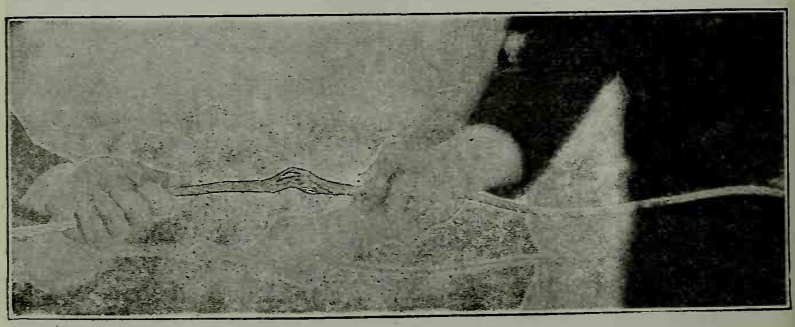


FIG. 47-10—The wrong way to take a kink out of wire rope, third mistake.

and then wormed, parceled, and served, and coated with tar oil and coal tar. The tar must be renewed at regular intervals; usually once in 6 months is sufficient. All rigging must be gone over carefully at frequent intervals to make sure that no part of it is deteriorating. If the wire is not galvanized, it should be covered with a mixture of red lead and boiled linseed oil before worming, parceling, and serving. Turnbuckles can well be preserved by giving them a very careful coating of heavy grease, then serving with a neat canvas cover over the turnbuckle to preserve the grease.

Smoke-pipe guys should be slacked off a bit when fires are lit off under the boilers to which the smoke pipes lead, as heat from the fires causes the smoke pipe to expand considerably.

Use of wire rope.—The principal causes of deterioration of wire rope are heavy abrasion, overstrain, bending, and corrosion. Evidence of abrasion is shown by the outside wires wearing thin in a short time. If the wires are slightly worn, breaking off squarely, and sticking out all over the rope, there is evidence of an overload or severe handling.

The sheaves and drums for wire rope are usually designed to be as large as possible, and the less flexible the rope the larger the sheave should be. The length of service decreases as the diameter of the sheave is made smaller. The space where the rope is to be used usually limits the size of the drums and sheaves. Wherever possible the drums and sheaves for wire rope of any construction should be so arranged that the rope is not bent in service, first in one direction, then in the reverse direction. If reverse bending cannot be avoided the sheaves about which the reverse bending occurs should be larger than other sheaves. This will increase the length of service of the rope.

Lubrication.—The wear upon a running rope is both external and internal, and as it is impossible in the manufacture of rope to provide lubrication for the entire life of the rope, it becomes necessary to use a lubricant of such a nature that it will penetrate to the center of the rope. A heavy bodied oil with graphite is a good lubricant, is cheaper than and as satisfactory as any of the proprietary lubricants. A heavy viscous preparation covering the outside of the rope does not give the internal lubrication necessary.

Clips.—A wire rope may be attached to its load by passing the end around a thimble attached to the load and bending the end back so that it is parallel to the long end of the rope. Clips can then be used to fasten the ropes together. A wire rope clip consists of a forged-steel

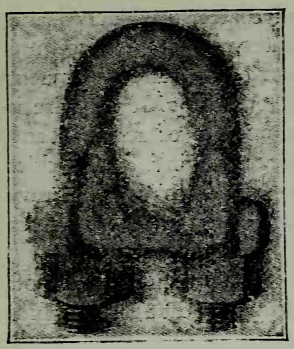


FIG. 47-11—A clip for fastening wire ropes. Note forged steel "roddle" having diagonal grooves which fit strands of rope.

roddle, the base having diagonal grooves which fit the strand of the rope. The end of the steel U-bolt passes through the roddle and the ropes are fastened by tightening the nuts on each end of the U-bolt. A clip of this kind is shown in Fig. 47-11 and also in Fig. 47-13.

A wire rope clamp consists of two similar pieces, each having two straight parallel grooves which fit the rope. A number of straight bolts (2 to 4) pass through the pieces and the ropes are fastened by tightening the nuts on each bolt. A clamp is shown in Fig. 47-12.

It is much safer to use *clips* than to use *clamps* for fastening wire rope. Clamps should never be used except for cases where the stress on the rope is low.

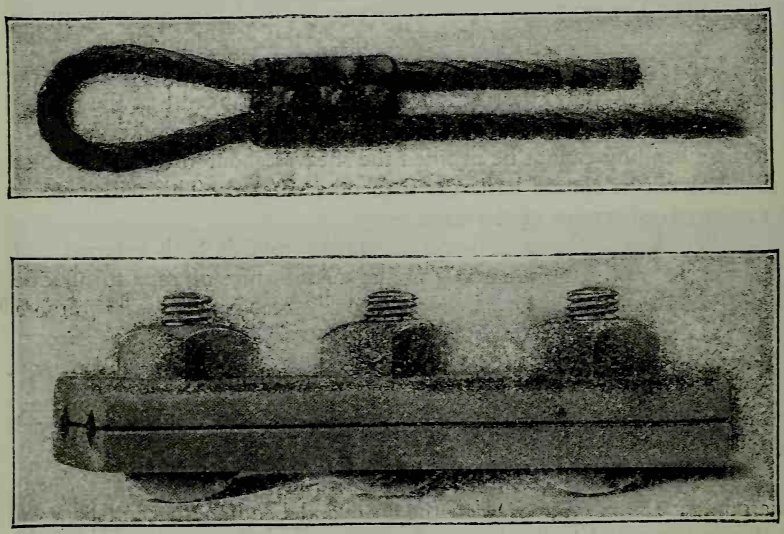
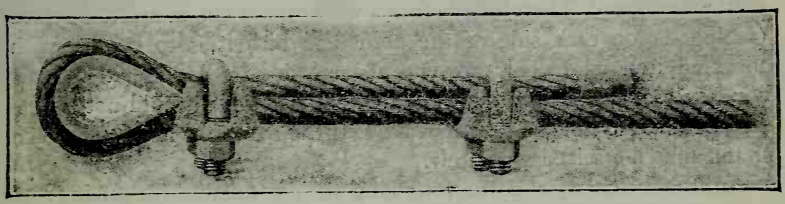


FIG. 47-12—Above: A wire rope fastening made with a clamp. Below: A clamp for fastening wire ropes.

Although fastening with clips requires little skill and can be readily inspected, the rope is apt to slip. The clip frequently crushes and bruises the rope and the strength of the fastening is usually less than 80 per cent of the strength of the rope.

The upper section of Fig. 47-13 shows the correct way to fasten wire rope with clips. The lower section shows two wrong ways to use the clips for fastening wire rope. The roddle should be in contact with the long end of the wire rope and the U-bolts in contact with the short end of the loop in the rope.



Correct way, roddle in contact with long end of rope.

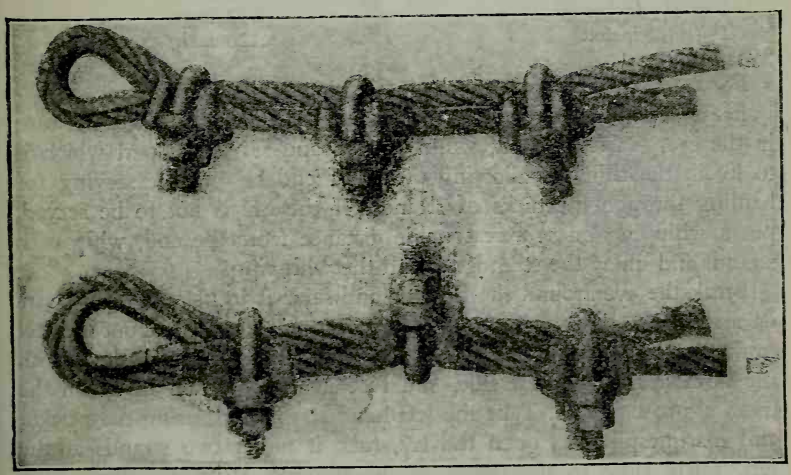


FIG. 47-13—Fastening wire rope with clips.
Incorrect way.

The distance between clips should not be less than 6 times the diameter of the rope.

Wire rope manipulation.—Wire splicing requires considerable practice. The best way to learn this work is by watching or assisting an expert. Where no instructor is available the figures and text of this book may be helpful as a guide while gaining practical experience.

The tools required for such work as is ordinarily done on board ship are (see Figs. 47-14 and 47-15):

Seizing or whipping.—The winding of wires into strands and strands into rope sets up stresses which cause the wires and strands to spring apart when freed. Therefore, before a wire rope is cut, it must be seized (whipped) on each side of the point at which it is to be cut, with annealed iron wire. This prevents its unlaying; otherwise it will get hopelessly out of shape. The fiber of fiber-clad rope should not be depended upon to hold in lieu of seizing. If the rope is to be spliced, each strand must be seized separately.

Annealed iron wire of the following sizes is suitable for seizing:

Diameter of rope	Diameter of seizing wire
½ inch and smaller	.041 inch
⅝ to ⅞ inch	.063 inch
1 to 1½ inches	.092 inch
1⅝ to 2 inches	.120 inch

For cables larger than 2 inches, seizing strand may be used.

Eye-splice.—Where an eye-splice is to be, serve before starting to turn in the eye, carefully paint, worm, parcel, and serve that part which is to lie in the thimble, allowing plenty of end beyond the serving for hauling through the tucks of strands. If the eye is not to be served, put a whipping on at a reasonable distance from the end, whip each strand, and unlay the strands beyond the whipping.

Break the eye around the thimble and seize it in place. Put the wire on a stretch at about waist height. With the strands lying about parallel to the part of the wire through which they are to be tucked, stand with the thimble on your left side, and face in the direction in which the tucks are to be made. Take the left-hand strand and, using the pricker and marlinespikes to open the lay, tuck it under two strands at the left, fairly close to the throat of the thimble. Withdraw the spikes and haul the strand down snug. Then take the next strand to the right of the first one tucked and tuck it in the same point, both under one

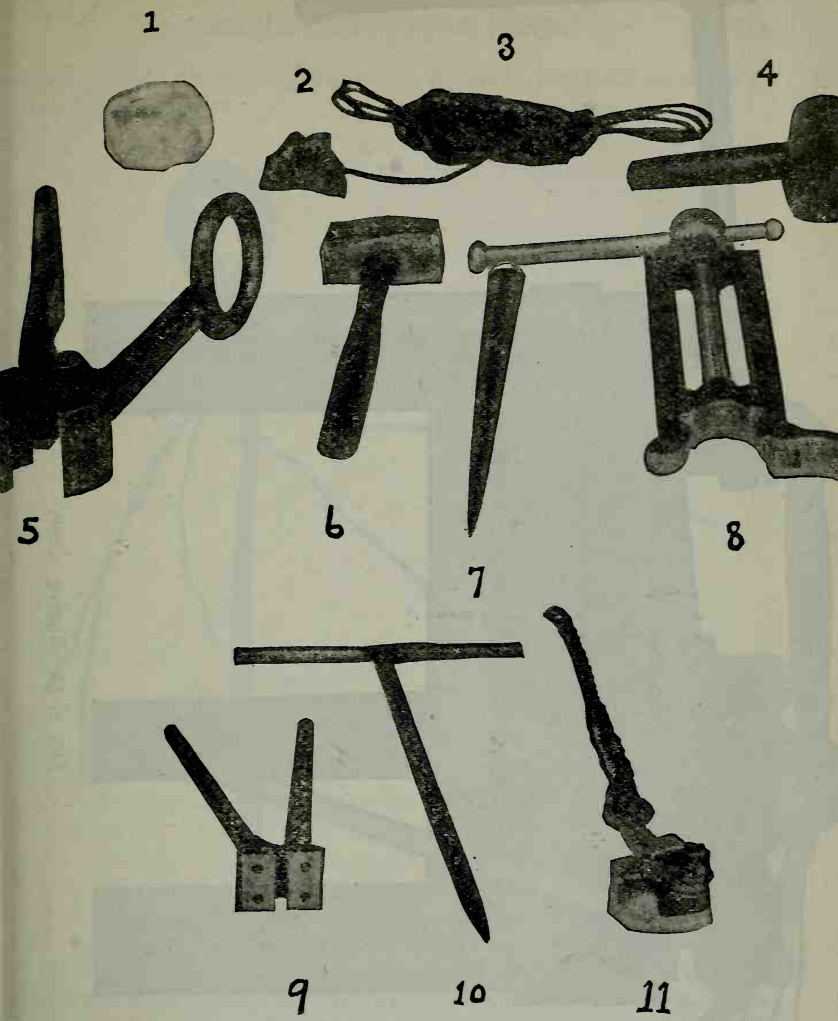


FIG. 47-14—Tools for splicing wire rope.

1. Twine.
2. Wax.
3. Marline.
4. Serving mallet.
5. Wire clamp.
6. Mallet.
7. Marlinespike.
8. Hand rigging screw, or bench rigging screw (see Fig. 47-15).
9. Wire cutter.
10. Splicing sword.
11. "Come along."

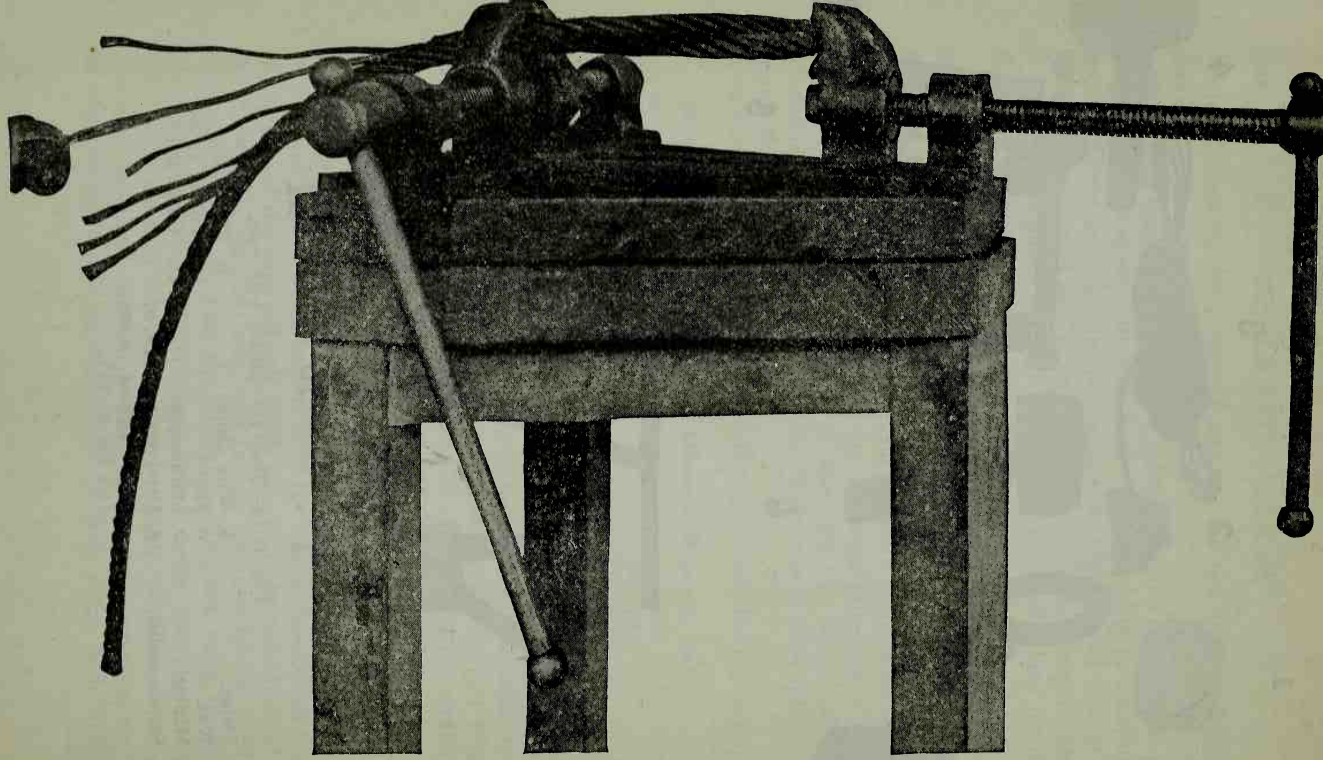


FIG. 47-15—Rigging screw.

strand. Pull it down snug. Figure 47-16 shows the first two tucks in an eye-splice in wire.

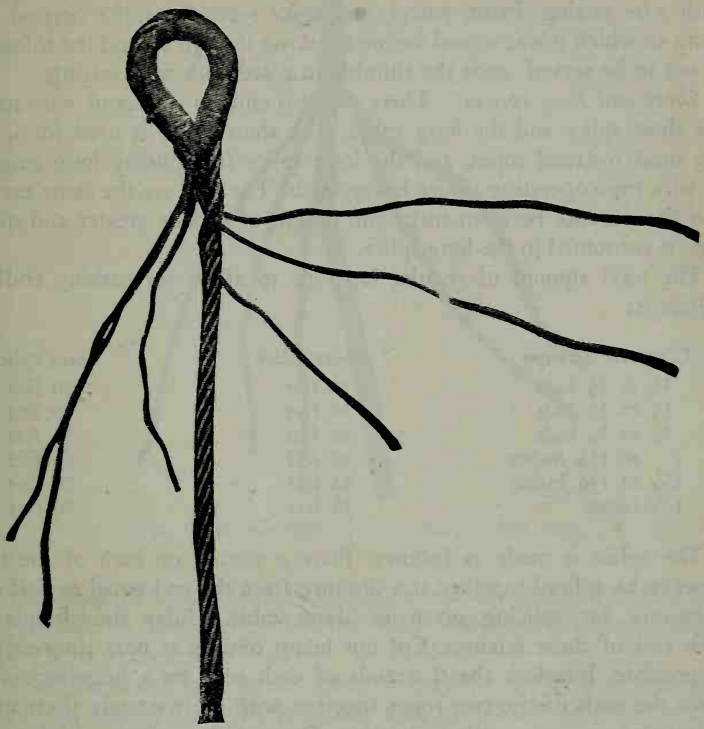


FIG. 47-16—Eye-splice, first two tucks.

Now take the next strand and tuck it in the next lay, under one strand and coming out where the first two strands were tucked in. Work around to the right, tucking each strand to the left, under one strand. When all strands have been tucked, put a selvagee strap on them, in the same order in which they were tucked, and haul each one down with a tackle, hammering the bights down smooth. Figure 47-17 shows an eye-splice after all strands have been tucked once.

Next, starting with the first strand tucked, pass each strand over one strand and under one, completing two full tucks. Haul down with a snug tackle, and beat into place. Then halve each strand and tuck

the reduced part in the same manner as the second tuck was taken. Then quarter the strands and tuck in again. The result is a *tapered eye-splice.*

If the wire being spliced is to be served, seize the thimble in place with wire seizing. Paint, parcel, and spike serve the splice beyond the point to which it was served before breaking the eye around the thimble. If not to be served, seize the thimble in place with wire seizing.

Short and long splices.—There are two endless splices of wire rope, the short splice and the long splice. The short splice is used for splicing most 6-strand ropes, and the long splice for splicing long lengths of wire rope operating under heavy loads. The two are the same except that the distance between tucks and length of tuck is greater and more rope is consumed in the long splice.

The total amount of regular lay rope to allow for making endless splices is:

Diameter of rope	Short splice	Long splice
¼ to ⅜ inch	15 feet	30 feet
½ to ⅝ inch	20 feet	40 feet
¾ to ⅞ inch	24 feet	50 feet
1 to 1⅛ inches	28 feet	60 feet
1¼ to 1⅜ inches	32 feet	70 feet
1½ inches	36 feet	80 feet

The splice is made as follows: Place a seizing on each of the two ropes to be spliced together at a distance from the end equal to half the allowance for splicing given in above table. Unlay the strands to each end of these seizings. Cut out hemp centers as near the seizings as possible. Interlock the 6 strands of each rope on a fingerlock, *i.e.,* force the ends of the two ropes together with their strands alternating in regular sequence with each other. Remove the seizings. Unlay one strand, filling the groove vacated by this strand with a corresponding strand from the other rope end, laying the strand in as tightly as possible up to within the length of tuck of the strand end. The length of tuck is about $1/12$ the length of rope allowed for the splice. Unlay the second strand of each rope and replace as was done for the first strand but stop at a distance of two tuck lengths from the point where the first pair of strands protrude. In a similar manner, the third strand from each end should be replaced by the strand from the other end for a distance equal to the length of tuck. The 12 strands now protrude from the rope in pairs at points separated by twice the length of tuck. Wrap the protruding strands with friction tape a distance from the rope equal

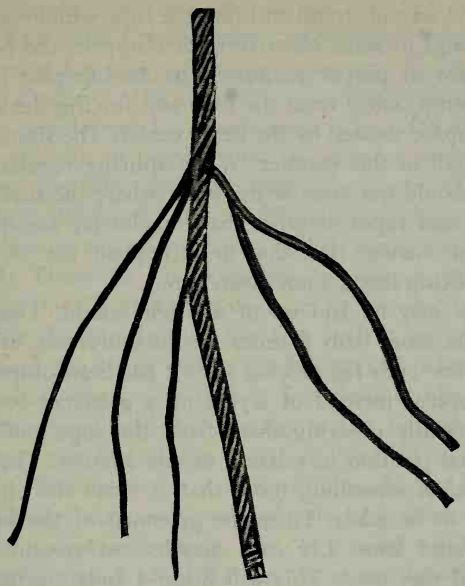


FIG. 47-17—Eye-splice, all strands tucked once.

to the length of tuck. The tuck should be built up evenly with tape until its diameter is only slightly less than that of the hemp center removed. Cut strand to tuck length.

Tuck the strand ends in the center of the rope in the space vacated by the hemp center. Each pair is tucked alike as follows: If a vise is available, it should be used. If no vise is to be had, a Manila rope sling and a short wooden lever may be used to untwist and open the rope. Place the rope in the vise so that the vise grips the rope and 1 of the 2 strand ends just beyond the point where a pair of strand ends protrude from the rope. Drive marlinespike under 3 strands, opening the rope so that the hemp center may be cut and the end pulled through the opening made by the point of the marlinespike. Start the wrapped strand end into the space left vacant by the removal of the hemp center. Rotate the marlinespike so as to force out the hemp center and force the strand end into the center of the rope. By rotating the spike, the strand end is tucked its entire length.

The rope is then regripped in the vise so that the second strand end can be tucked. Drive the marlinespike under 3 strands as before. In or-

der to start the second strand end into the rope without any slack, a pair of splicing tongs or some other form of clamp should be used to force this strand into its proper position. The marlinespike is then rotated, forcing the hemp center from the rope and forcing the wrapped strand end into the space vacated by the hemp center. The strand end is tucked its entire length in this manner. When splicing regular lay ropes, the strand ends should not cross at the point where the tucks begin. Eight-strand ropes, and ropes of other than regular lay are spliced in somewhat different manner, but due to infrequent use in the Navy the method of splicing them is not given here.

A *grommet* may be laid up of a single strand. The length of the strand must be more than 6 times the circumference of the grommet, in order to allow ends for tucking after it has been properly laid up.

A more popular method of laying up a grommet of wire is to use 2 strands, carefully unlaying them from the rope and keeping them in their normal position in relation to one another. The length of the 2 strands used is something more than 3 times the circumference of the grommet to be made. Form the grommet of the bight of a left-handed overhand knot. Lay each double end around in the lay of the bight until they meet. This will bring 4 ends together, with a pair pointing each way, and 6 strands around the bight or grommet. Now cast off the seizing that holds the ends of pairs of strands together. Unlay one strand's end a few inches at a time, and lay the opposing strand's end in the lay vacated as the strand was unlaid. This will separate the points at which pairs of opposing ends meet. Having separated the meeting points of opposing pairs, cross and tuck the ends in the same manner as in tucking the ends for a long splice.

Sockets are attached to the ends of wire rope to provide means of fastening hooks and other attachments. Sockets are classed as open or closed, depending on whether they are of the clevis type with jaw and pin, or are made with loop integral with the basket. Although the attaching a socket is somewhat beyond the scope of this *Manual,* the seaman should be familiar with this installation which is made as follows:

The rope end should, as has been said, be whipped (seized) near the end. Place an additional seizing on the rope end to be socketed, at a distance from the end of the rope equal to the length of the basket of the socket. It is very important that the seizing be carefully applied to prevent untwisting of the wires and strands, which would result in unequal tension in the various wires after the socket is attached. Place

the rope end upright in a vise. Remove any seizing above the one at basket length from end. Cut out hemp center down to seizing. If the center is not hemp but wire, allow the center wire to remain. Untwist the strands and broom out the wire. The wires should be separated from each other but should not be straightened. Clean the wires carefully with benzine, naphtha, or gasoline, for the distance they will be taken into the socket; then dip them in a bath of commercial muriatic acid for 30 seconds to 1 minute, or until the acid has thoroughly cleaned each wire. To remove the acid, dip into boiling water containing a small amount of soda. Draw the wires together (a piece of seizing wire will be suitable to do this) so that the socket can be forced down over them. Force the socket down over the rope end until it reaches the seizing on the rope. Free the wires within the basket and allow them to expand evenly within the socket basket. The ends of the wires should be level with the upper end of the socket basket. Care should be taken to see that the center line of the basket is lined up exactly with that of the rope, *i.e.,* that the socket is in a true straight line with the rope, so that when loaded each wire will take its proportionate share. Seal the base of the socket with putty, clay, or similar substance. Fill the socket basket with molten zinc. The zinc must not be too hot, particularly on small ropes. From 800 to 850 degrees F. is the correct temperature. Allow to cool in air or by plunging into cool fresh water. Remove the seizing and the socket is ready for service.

Wire splice, Gun-Factory type.—Figure 47-18 shows a type of wire splicing used in the Naval Gun Factory, Washington Navy Yard, for handling of all guns and ordnance material.

The instructions for preparing 6-strand wire for splicing are as follows: Seize wire with marline about 2 feet from end, to prevent unraveling while splicing. Then whip each end of the 6 strands. Now the wire is ready for splicing. After the size of eye required has been determined, start splicing as follows: Tuck first strand under 3, second strand under 2, third strand under 1. The other 3 strands are tucked under 1, and over 1, as illustrated in Fig. 47-18. Then cut the ends of strands close to the standing part of wire, and serve with marline.

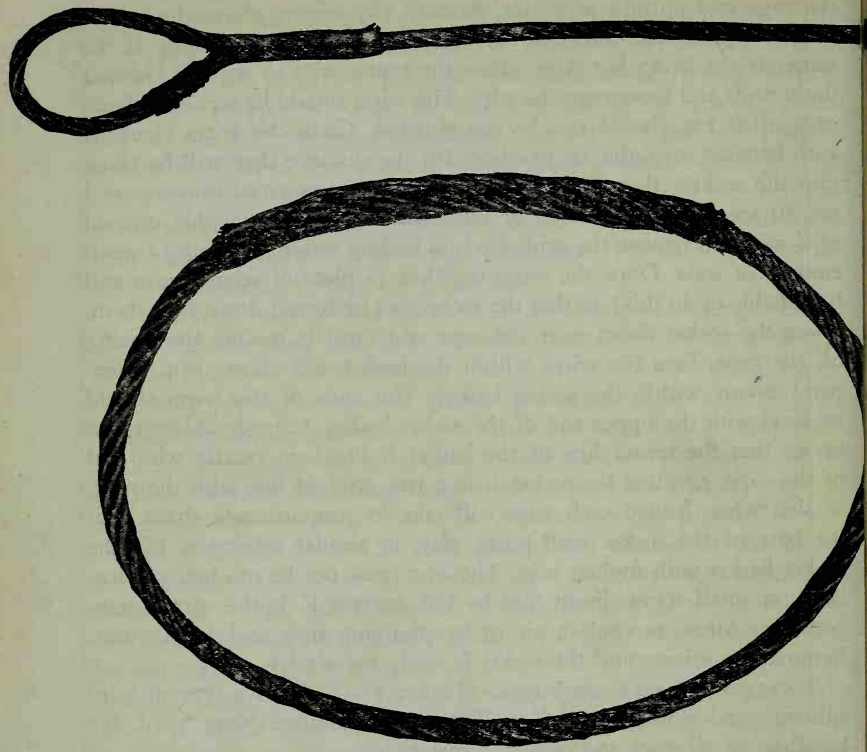


FIG. 47-19—Gun-Factory splice, showing short eye-splice and strap of 6-strand wire.

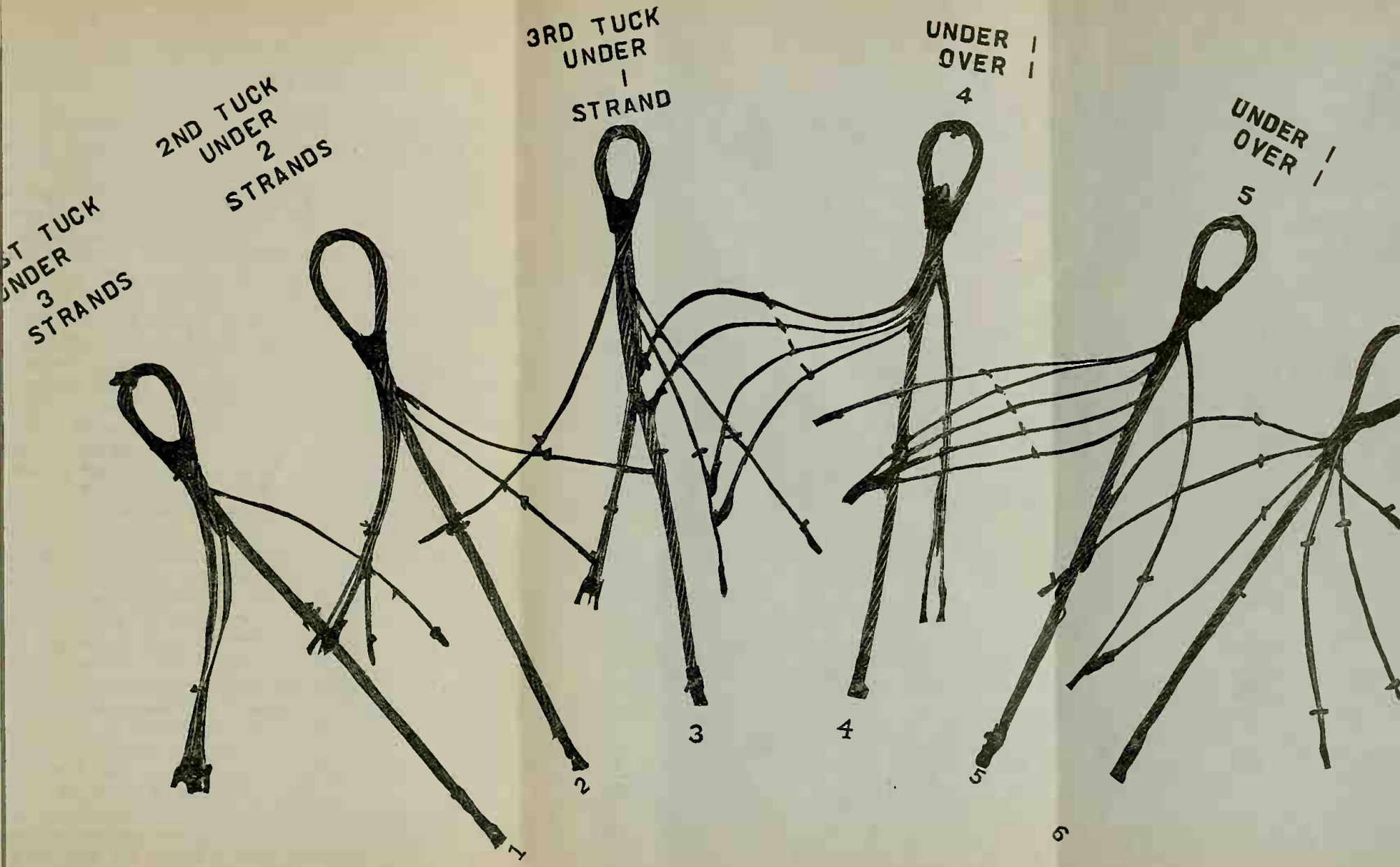
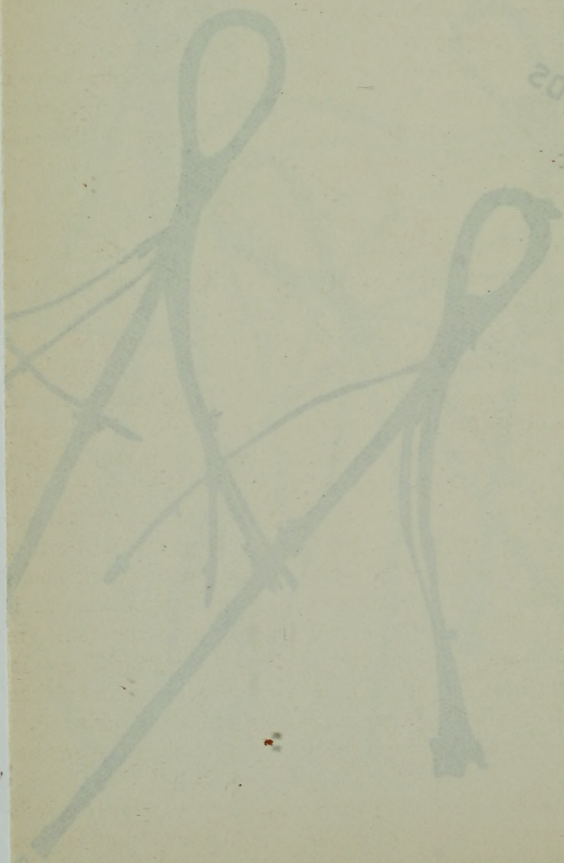


FIG. 47-18—Gun-Factory wire splice in 6 stages.


2ND TUCK
UNDER
2
STRANDS
1ST TUCK
UNDER
3
STRANDS

CHAPTER 48

DECK SEAMANSHIP

DECK seamanship deals with the ship work done by men in performing strictly seaman duties. Parts of it are properly covered under "boats," "marlinespike seamanship," "ground tackle," etc.

Hoisting and lowering boats.—While the hoisting and lowering of boats was partially covered under "lifeboats," it is considered that a more detailed procedure is worth-while here.

When hooking on the boat falls, first overhaul the falls so as to have plenty of slack, then clear the falls and hook on the forward fall first. The forward hook should always be hooked from forward aft and the after hook from aft forward. Get all turns out of the falls before a strain is put on and tend them carefully.

It is extremely dangerous to take the turns out after the weight of the boat is on the falls. The strain put on the hook under these conditions is often severe enough to cause the hook to shear off and the boat to drop. When turns develop in the falls, the boat should be lowered and the turns taken out.

In hoisting, the two falls first have the slack taken in and are then held together in the hands. The boatswain's mate then orders: *Set taut; hoist away.* The men should take the boat up smartly with an even pull and should keep step with each other in order to pull together. The boatswain's mate should be the only one to talk or give orders. The men as they reach the end of the deck should break off, fleet back, and again man the falls until the boat is two blocks.

When the boat is up two blocks, the men tending the falls either pass the stoppers, or, if the boat is light, get out on the davit heads to "four-in-hand" the falls. The stopper is made fast to the davit head and is used to hold the boat two blocks while the falls are being belayed. It is passed by leading the end through the eye in the lower block or through the ring in the boat, thence over the davit head and is secured with several turns around its own part under the davit head. The end is held in the hand until the falls are belayed, then the stopper is taken off.

There is still another way of passing the stopper. One end is permanently made fast near the foot of the davit. The stopper is next led up the davit and a hitch is taken around the davit between the

sheave and the cleat. From here the end of the stopper is passed around the boat fall and secured by a stopper hitch.

In four-in-handing, a man straddles each davit and grasps the falls about 10 inches from the block. They then slide down the davits far enough so that their arms will be straight. In this position they can hold the greatest weight. Men should never get their hands too close to the blocks, as a slight give may cause their hands to be caught in the block and to be severely injured. If the boat is quite heavy, two men should be on each davit, the second man being as close to the first as possible.

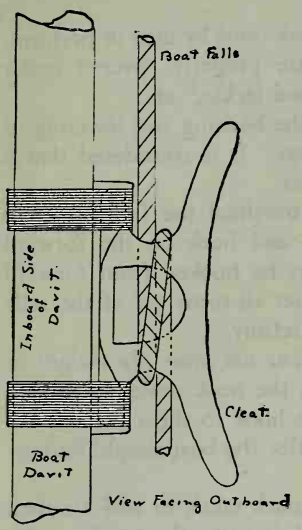


FIG. 48-1.

When the boat is two blocks and the stopper has been passed or the falls four-in-handed, the boatswain's mate orders, *Walk back handsomely,* and then, if the stopper holds, *Up behind.* The men nearest the davit should overhaul the falls before letting go to give the men at the davit enough slack to belay the falls. The falls are belayed by taking two full turns around the cleat from outboard to inboard, followed by half hitches (see Fig. 48-1).

To lower, it is first seen that the falls are clear for running, and then all but 1½ turns are thrown off each cleat. Orders having been received to *Lower away,* the falls should be eased so that they will slide over the cleat with an even motion. They must be watched carefully all during the lowering to prevent them from jamming or jumping the cleat. Under the direction of the petty officer in charge of lowering, the men on the falls must keep the boat on an even keel. When the boat is near the water, an order to let go may be given and the falls will then be quickly cast off both cleats together.

The falls should be cleared, sea painter led out, heaving lines coiled, and all other preparations for receiving the boat made prior to the boat's return if she is to be hoisted.

Blocks and tackles.—A frame of wood or metal which incloses one or more sheaves, or pulleys, is known as a block. By leading a line over the sheaves, the power applied to the hauling part of a line

may be conveniently multiplied before it reaches the object on which a pull is to be exerted. These combinations of lines and blocks are known as tackles (*pronounced tākles*).

Blocks ordinarily consist of four parts, (1) the frame or outside; (2) the sheave or wheel over which the rope passes; (3) the pin or axle on which the sheave turns; and (4) the strap inclosing the frame by which the block is held together. As has been stated, the frame may be of either wood or metal, but the use of metal blocks is more general. The sheaves are usually of metal, but may be of lignum-vitæ; the pins are metal; the straps may be of metal or rope, but rope-strapped blocks are seldom seen in the United States Navy. Blocks whose frames are composed of several pieces riveted or bolted together are called *made blocks,* while those having the frame in one piece are called *mortised blocks.* The hole in the sheave, for the pin, is usually lined with composition to decrease the friction and is called a bushing, but some patent blocks have the sheave fitted with roller bearings. The sides of the frame are called the *cheeks* of the block. The holes through which the rope reeves are called the *swallows.* The grooves cut on the sides and one end of the cheeks to allow the strap to fit in are called the *scores.* The end of a block which is opposite to the swallow is called the *breech.* The complete outer part is known as the *shell.*

A block may take its name from its particular use, its shape, or the place it occupies. Most types of blocks may be *single, double, treble,* or *fourfold,* depending upon the number of sheaves the block has. The length of the frame determines the size of a block, *i.e.,* a 12-inch block is a block with a frame 12 inches long. Standard blocks are furnished in sizes from 4 to 24 inches; thus, we might have a 12-inch, threefold, metal cat block. Several types of blocks are illustrated in Fig. 48-2. The fiddle block gets its name from its shape, cat and fish blocks from the fact that they are used for catting and fishing an anchor, and gin blocks from the fact that they were originally attached to gins, which are 3-legged, portable, hoisting rigs.

Snatch blocks are fitted with a hinged shell or hook, so that a rope may easily be snatched on the bight. These blocks are about the handiest used aboard ship. When used, care must be taken to see that they do not open at the wrong time.

Gin blocks.—In this type the shell is merely a guard to keep the rope from running off the score of the sheave.

A fish block is the lower block of a fish tackle fitted with a fish-

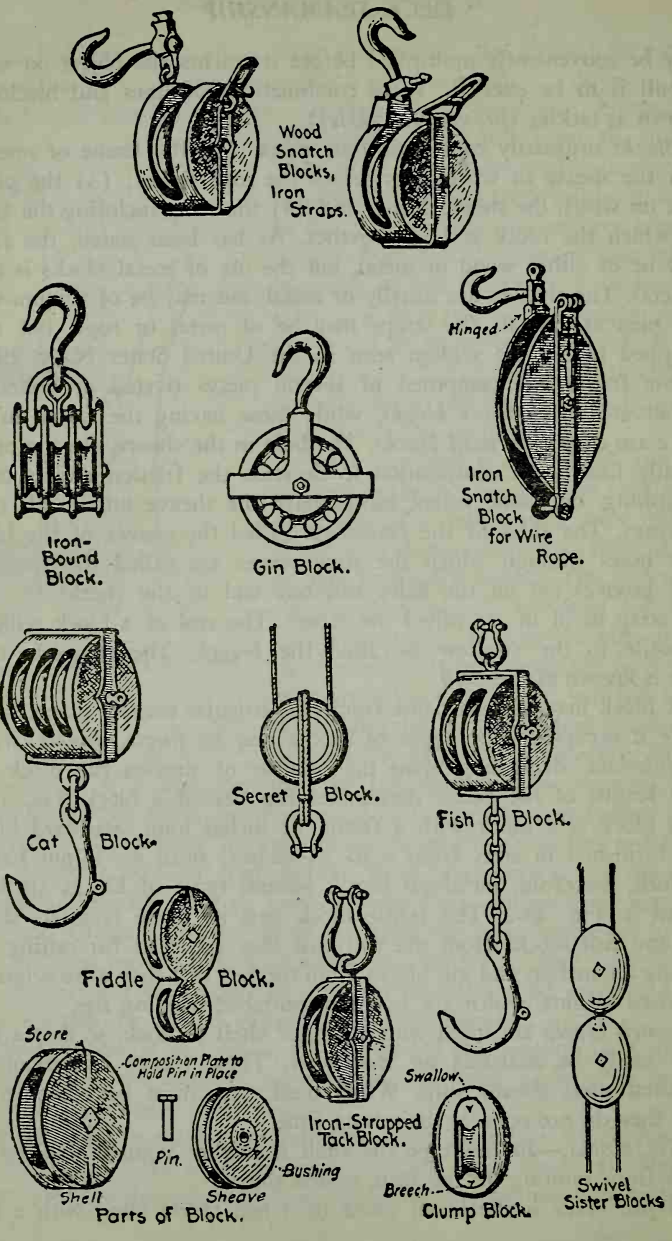


FIG. 48-2—Blocks.

hook and used for fishing an old-fashioned anchor. Where anchors are catted, the upper sheaves of the cat fall are rove through the cat head and the lower through the cat block and the cat block is fitted with a cat hook. Fishing cat blocks are either double or treble blocks.

Sister blocks have two sheaves in one shell, one above the other, so fitted that the falls lead in opposite directions.

A secret block is used when it is desired to prevent gear fouling in the block. This is a single block with a closed shell having two holes in the lower part through which the fall passes.

A fiddle block is a double block having the sheaves in the same position as found in a sister block but the falls lead the same way instead of in opposite directions.

A clump block is a very small and very strong egg-shaped block with a rounded shell.

A sheet block has only a half a shell covering the sheaves.

There are several other types of blocks, such as tye blocks, dasher blocks, jerr blocks, and tail blocks. These blocks are not described as they are not common aboard naval vessels. The general principles of all blocks are the same and the boatswain's mate should have no particular trouble in using blocks properly if they are kept free of dirt, rust, etc., and are properly lubricated.

Strapping blocks.—A strap may be made either by splicing two ends of a rope together or by working a grommet of the proper length. About once and a half around the block will allow an end for splicing. Pass strand of rope through eye of hook, then fit to block and splice or work grommet. Put seizing on strap between thimble and block. Splice goes at breech of block. It is sometimes thought best to worm, parcel, and cover strap with leather before securing it in place.

Overhaul of blocks.—Blocks must be overhauled at regular intervals to keep them in good working condition, as they are exposed to salt air which causes rust and tends to "freeze" them in a short time. To disassemble blocks, the pin and sheaves are taken out and all grease and rust are then carefully removed. Care must be taken not to use emery any more than is actually necessary to remove rust as this wears away the pin. Before assembling, the pin should be carefully greased with heavy grease or with a mixture of tallow and white lead.

In using blocks, pay particular attention to the line which is rove through the block. The line must be clear for running and should have

no knots or kinks to prevent easy passage. All blocks should have straight leads. Before power is applied it must be seen that the line is not jammed between the sheave and the cheek of the block. A snatch block should always be used if there is any danger of a fall or other line chafing.

Tackles.—There are many types of tackles, their names depending on the number and method of use of the blocks, but any type may have a special name derived from its use. The types usually seen on board ship are as follows (see Fig. 48-3):

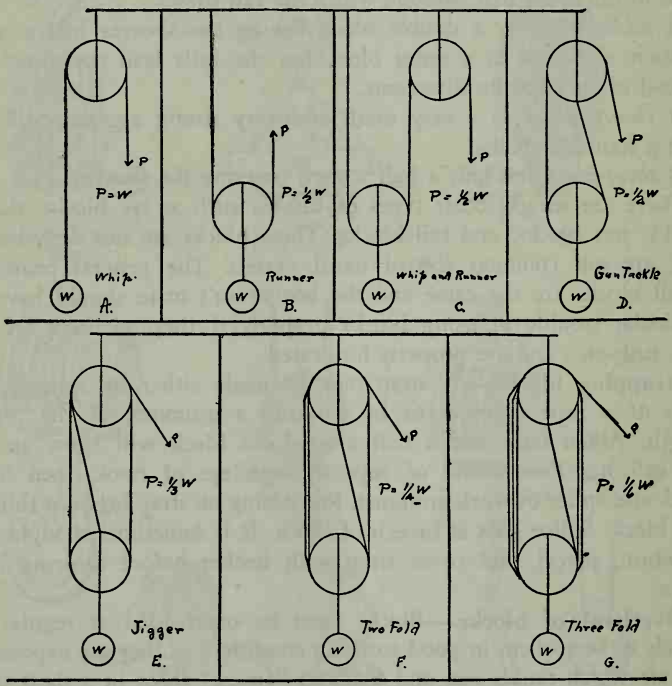


FIG. 48-3—Tackles.

Single whip.—A fixed single block attached to a standing part. It does not multiply the power applied, but furnishes a convenient method and smooth pull for hoisting.

Runner.—A single block which is free to move along the line, one end of which is a standing part. It doubles the power.

Whip and runner.—Two single blocks, one rigged in each of the above ways. It doubles the power.

Gun-tackle purchase.—Two single blocks, the lower a runner and the upper fixed. The standing part of the line is attached to the breech of the upper block, and the line then passes over first the lower and then the upper block. It doubles the power.

Luff tackle.—An upper double block and a single lower. The standing part of the line is attached to the top of the lower block. It triples the power.

Twofold purchase.—Two double blocks. The standing part is made fast to the block from which the hauling part comes. Used for boat falls. The pull on this is ¼ the weight lifted.

Threefold purchase.—Two triple blocks. This is the heaviest tackle usually found aboard ship. Used for handling ground tackle and other heavy weights. The pull is ⅙ the weight lifted. The standing part is made fast to the block from which the hauling part comes.

Jiggers.—These are usually merely a luff tackle.

The following tackles are not so common but are included as they may be of assistance to boatswain's mates under certain conditions:

Luff upon luff.—A luff tackle is clapped on the hauling part of another luff. If the double block of the first luff is fixed, a theoretical gain of 12 times the power is obtained. Where double blocks move, the power gained would be 16.

Spanish burton.—Two single blocks are used. One block is fixed and its hauling part is secured to the second block.

Double Spanish burton.—The principle of the Spanish burton is used here in a combination of a double and two single blocks.

Notes on tackles.—Some of the power increase is lost by friction. "What is gained in power is lost in speed."

In hoisting, the greatest strain is on the hauling part; in lowering, it is on the standing part.

The greatest power is secured from a tackle by hooking the block from which the hauling part is led to whatever is to be moved.

Tackles add to the smoothness and regularity of the pull, as well as multiplying the power.

Power is lost by using a block only as a fair lead, as with a snatch block.

A deck tackle is made up in the following manner: The fall is hauled through until the blocks are about 3 feet apart. Place the blocks down, point the hooks up, pointing the same way, and then coil the

fall around the blocks. A clove hitch is made in the end of the fall around the whole tackle between the blocks. If the tackle is made up in this manner, it can be carried from place to place, stowed, and yet be cast loose and overhauled without danger of jamming.

When hoisting a heavy weight a stopper should always be provided unless the weight is small enough to be handled by hand while the hauling part is being secured.

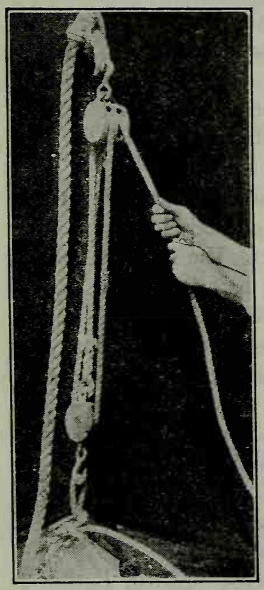


FIG. 48-4—Clapping a jigger on a rope.

When blocks capsize, care must be taken in taking out the turns of the fall. In hanging tackles, particularly, the lower block is always liable to turn over when rounding up the fall.

Clapping a jigger on a rope.—A jigger is a light luff tackle having a single and double block; the double block is usually fitted with sister hooks and the single block fitted with a plain hook. The single block is always hooked to the weight to be hoisted or to some fixed part, and the double block is clapped on the rope. In this position a pull on the jigger will multiply to about 3 times as much at the single block. A man pulling 150 pounds will be able to lift a weight of about 450 pounds. The jigger is used frequently aboard ship where a heavy pull is required and only a few men are available. A lifeboat, for instance, which has been lowered by the stern for draining can be two-blocked by one or two men by clapping a jigger on the after fall. To clap a jigger on a rope, a strap is wound around the rope and the jigger hooked into the two ends. Sometimes the upper end of the strap is brought down to the lower end and looped over it; the jigger is then hooked to the lower end.

Rigging booms.—Ships burning coal are all supplied with booms for hoisting coal bags aboard. These booms with their supports are placed where they will plumb the coal chutes near them. The number and type of coaling booms vary with each type of ship. Each coxswain must know how the booms on his ship are rigged, how the whip from each boom is led to the deck winch, and the proper lead for each boom guy (see Fig. 48-5).

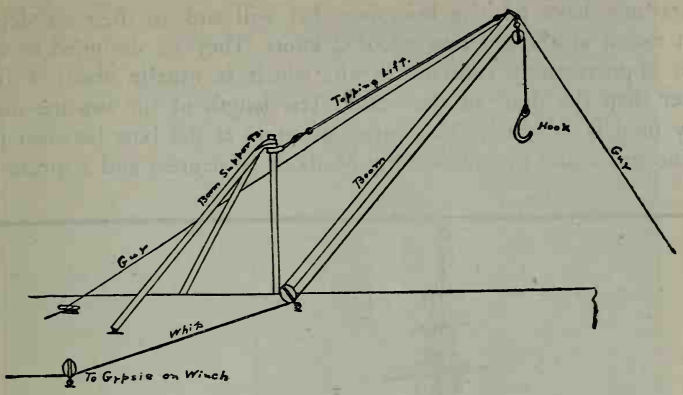


FIG. 48-5—Typical coaling boom.

Chain hoists have many uses aboard naval vessels. Many different designs are supplied, the most common met with aboard naval vessels being the screw hoist. In this type the essential feature is an endless screw working on a worm. The planetary type is rather common for hoisting very heavy weights. The heaviest hoists of this type may be used for weights up to 40 tons. In all chain hoists the maximum design lift for the particular hoist will usually be found stamped on the hoist.

The paravane is a special type of water kite which, when towed with a wire rope from the forefoot of a vessel, operates to ride out from the ship's side and deflect mines which are moored in the path of the vessel and to cut them adrift so that they will rise to the surface and may be destroyed.

Paravane gear is a permanent military feature on naval vessels, including auxiliaries, having a mean draft of more than 12 feet. The gear is not installed on destroyers, gunboats, monitors, tugs, patrol boats, or mine sweepers, even though the mean draft be more than 12 feet, except when especially directed by the Bureau of Ships in individual cases.

Three types of paravanes are used. Type M is for merchant ships and other vessels having a speed not exceeding 16 knots. Type B is for battleships and other large vessels whose speed does not exceed 22 knots. Type C is for cruisers and vessels whose speed is over 22 knots but does not exceed 28 knots.

Paravanes have positive buoyancy, but will sink to their set depth when towed at a speed upward of 2 knots. They are designed to run at an approximately constant depth, which is usually about 5 feet greater than the draft of the vessel. The length of the towline ordinarily used is 56 yards. This gives an angle at the bow between the towline and center line of the ship of about 30 degrees and a spread of

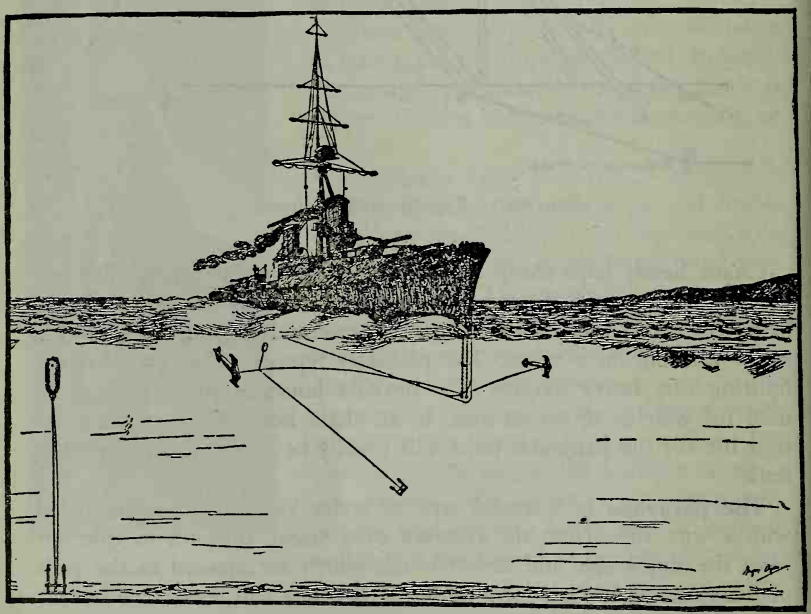


FIG. 48-6—Paravanes.

about 110 feet from the center line of the vessel. In general, paravanes will protect a vessel at all speeds from about ⅓ of her maximum upward. The cutter requires no setting and can take two parts of a mine mooring in rapid succession. It will sever half-inch wire with a pull of 700 pounds.

Due to the excessive vibration set up in the towing ropes when towing paravanes, it is necessary to terminate the ropes at the paravane in a special form of towing sleeve. To permit the replacement of the rope, the ship end of the tow rope should be accessible and therefore arrangements for towing must admit of raising the point of tow from

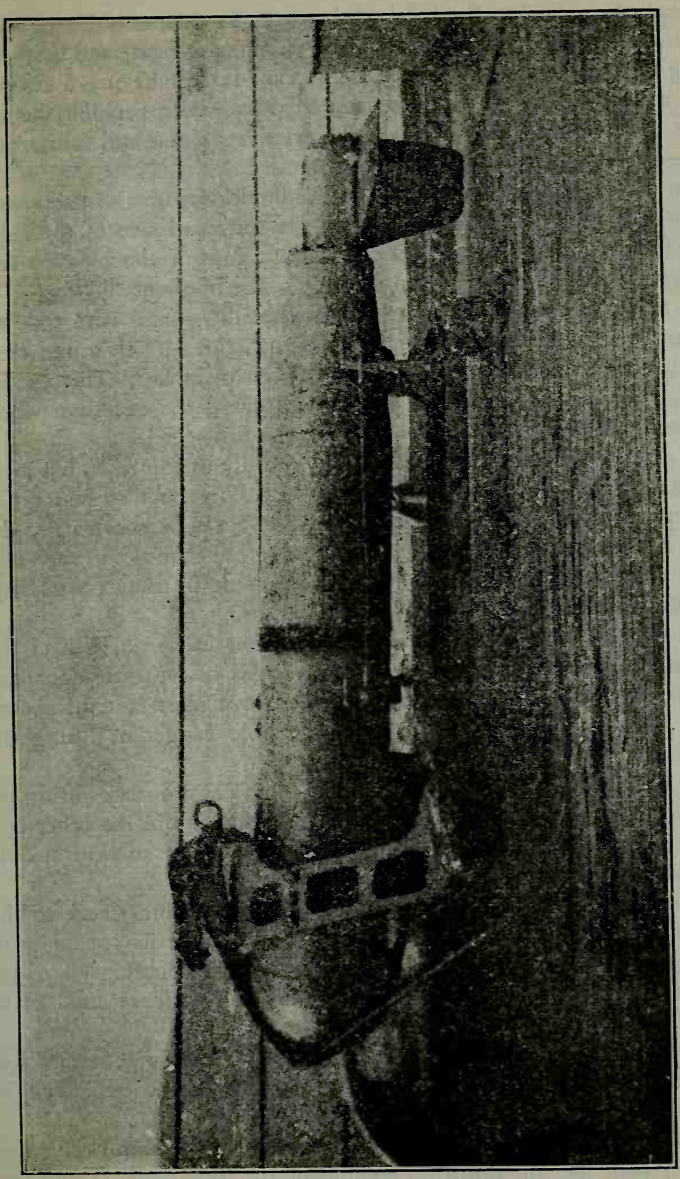


FIG. 48-7—"PV" or paravane used for cutting mines.

the level of the keel to the level of the deck. Two types of fittings are used to accomplish this result, (1) the clump-and-chain, and (2) the sliding-shoe devices. The former is used on vessels having a clipper bow or the forefoot cut away to such an extent as to prohibit the use of the sliding shoe. The sliding-shoe device is simpler and is used on all vessels having sufficiently straight stems.

Two booms are used for launching and picking up the paravanes, one fitted on the port side and one on the starboard side of the ship. These booms are capable of taking a working load of about 4 tons and have a maximum overhang from the ship's side of about 7½ feet.

The towrope consists of a specially designed 3-strand wire rope of $1\frac{1}{16}$-inch diameter. Each of the 3 strands contains 37 galvanized steel wires having a breaking stress 120 tons per square inch. This special rope is necessary as no ordinary rope will stand the excessive vibrations set up by the paravane when running at full speed.

No definite time can be laid down for the life of the rope, but after towing at high speed the individual wires break in about 70 hours, like those of trawl rope after months of service. Such fatigue usually develops gradually along the bight of the rope but may occur very rapidly at any particular point should the rope come in contact with anything of a rigid nature.

The rope should be examined carefully after each run both at the ship end and at the paravane end. If any signs of wear are apparent, the rope should be replaced by a spare one, for it must be remembered that if the towrope parts there is considerable danger of losing the paravane.

The towrope is connected at one end to the appropriate fitting on the ship by means of a closed socket and shackle and at the other end to the paravane by means of the special sleeve and shackle already described.

Great care should be taken in connecting the towing sleeve to the paravane to insure that the chamfered surface lies in its correct position relative to the paravane as otherwise the mine mooring on reaching the sleeve will catch in the sharp point of the sleeve and fail to enter the cutter.

Painting.—The exterior of the oscillator and that part which was originally painted should occasionally be scraped and repainted as necessary.

Line-throwing equipment.—Vessels which carry saluting guns are supplied with the line-throwing equipment for these guns. These ves-

sels and also vessels which are not supplied with 3- and 6-pounder saluting guns are supplied with the .45-caliber line-throwing equipment.

The 3- and 6-pounder equipment consists of special line-throwing projectiles, lines, faking board, and line boxes.

The charges used for these guns are the regular saluting gun cartridge cases loaded with weighed charges of saluting powder. The loading of these cartridge cases is the same as that used for saluting charges except the amount of powder is weighed rather than measured by the size of the cartridge case. The following table gives the amount of powder to be used with each projectile:

3-pounder		6-pounder	
250 yards	8 ounces	300 yards	9 ounces
300 yards	10 ounces	350 yards	12 ounces

It is difficult to control the range by varying the weight of the charge. Not less than 6 ounces nor more than 12 ounces shall be used for the 3-pounders and not less than 9 ounces nor more than 13 ounces for the 6-pounder projectile. The projectile may be fired without fitting it in the case but less regularity will then be obtained.

The projectile consists of a long rod which is loaded into the muzzle of the gun. The lower end of the rod is fitted with a weight which fits closely in the bore of the gun and into the cartridge case. The outer end of the rod is formed into an eye to which a thimble is fitted for attaching the line.

The gun is prepared for firing a line by first faking the line on a board which is fitted with wooden pins on which the line is laid down in regular diagonal tiers. The board is then turned over into the line box and removed so that the line is in the box and ready for running out. About 2 fathoms of the line from the end is wet down to prevent its being burned by the powder gases. It is then secured to the thimble in the end of the projectile.

The projectile is then loaded in the muzzle of the gun so that it projects from the breech of the gun. It is fitted into the cartridge case which is then loaded into the gun. The charge used should be large enough to carry the projectile well beyond the target so that the projectile will fall beyond the target while the line will fall across it. Since the projectiles are heavy, it is necessary that they be thrown clear of ships or docks, otherwise they will do considerable damage. It is preferable to use the line provided, but if these should not be available, any soft, pliable line of the required size will be satisfactory.

The projectiles, cartridge cases, and powder are supplied by the Bureau of Ordnance, while the lines, faking boards, and line boxes are supplied by the Bureau of Ships.

The .45-caliber line-throwing equipment is put up in boxes containing the following:

(1) One .45-caliber Winchester repeating rifle.
(2) 50 cartridges.
(3) 10 projectiles.
(4) 4 lines.
(5) Spindles.
(6) Cleaning gear.
(7) Book of instructions.

The .45-caliber line-throwing gun consists of a sawed-off .45-caliber Winchester repeating rifle. It has a lever action and fires a special blank cartridge which is supplied with the outfit. The projectiles are short steel rods with an eye in the outer end to which the line is secured.

The line is a special braided soft, pliable line which is made up in balls or rolls so that it will unwind freely from the inside. It is made up on special wooden spindles which are supplied with the outfit. It should be carefully and loosely wound on these spindles. It is possible to rewind the line after it has been used.

In order to use this equipment, the inner end of the line, which is secured in a notch in an end of the wooden spindle, is tied to the eye of the projectile, by the use of a long loop so that the actual knot of the line is outside the muzzle of the gun.

The special blank cartridge is then placed in the chamber of the gun and the projectile is dropped down the muzzle. The ball of line should be held by another man and when ready the spindle is removed from the ball and the ball is pointed in the direction of the target. The gun is then fired either from the shoulder or from a rest at such an angle that the projectile will pass over the target, carrying the line so that it falls on the target.

Care should be taken in using this gun to be sure that the projectile is fired beyond the target and does not strike personnel. The range is about 100 yards.

This equipment should be kept ready for use at all times and the rifle should be given the same care as the regular .30-caliber service rifle. When in storage or when not in use, the barrel should be kept lightly oiled.

CHAPTER 49

INSTRUCTING, MESSES, PRECEDENCE

Giving proper instruction and information.—Coxswains must realize the importance of giving proper instructions and information to seamen. One of the principal duties of a petty officer is to instruct the men under him in the proper performance of their duties. Before any one can properly instruct a person, he must first learn every detail of the work himself. It happens too frequently that a squad leader appears before his squad with only a vague idea of the drill he is to give them. He has not taken the time to study the drill beforehand and, as a result, his efforts are a failure. It is the most important part of every instructor's duties to see that he has complete and detailed knowledge of every drill or other type of instruction which he is to hold. A failure to have this knowledge makes him the laughing stock of his men and marks him as a complete failure as a leader of men. There can be no actual leadership without full knowledge. Leaders must never trust their memory too long, but should study the details of their drills beforehand, so that there can be no question of their ability to carry out proper instructions. Men respect their leaders for what they know. They soon find out whether or not their leader knows his job. Bluffing never hid ignorance for long. It is always found out, and it always stamps a leader as a failure.

Besides being able to give proper instruction and information to nonrated men, a coxswain should learn how to get them to carry out his instructions. He should be able to direct them in their work and see that they do it properly. Many petty officers fail in this important task. They usually end up by doing the most of the work themselves. By doing this he wastes the efforts of the men under him, and the net result is a very inefficient unit in the ship. The first requirement to attain efficient leadership is for the coxswain to know every detail himself. The men will immediately have high respect for him on this account alone and will be glad to take his orders.

Sources of exact knowledge.—The average intelligence and executive ability of two men being equal, the man who knows exactly where to find detailed and accurate information in regard to a given subject is always of a great deal more value than the man who has a general fund of information in regard to a number of subjects but who does not take

the trouble to obtain exact knowledge in regard to the subject under consideration.

No matter how great a man's experience has been in the practical line of his duties, there will come a time when he will have to refer to a textbook in order to obtain exact information.

In the following books a petty officer can obtain exact information in regard to all subjects he is required to know:

Navy Regulations.
Uniform Regulations.
Gunnery Instructions.
The Landing Force Manual.
Small Arms Firing Regulations.
The Bluejackets' Manual.

The pamphlets issued by the Bureau of Ordnance.

The manuals published by the various bureaus of the Navy Department.

Manufacturers of various mechanisms and devices used in the several departments on board ship are usually very glad to send catalogues and descriptions of their gear upon application. These pamphlets sometimes contain valuable information on their respective subjects.

Practically every ship in the Navy has a library which is supplied with standard textbooks on all subjects of which information is required on board ship. Apply to the chaplain for information relative to these books or, if there is no chaplain aboard, the navigator or educational officer will assist you.

Duties in connection with messes.—The ship's crew is divided into messes of about 20 men each, each mess being made up of men from the same division if possible. As far as practicable messes are set in that division's part of the ship. A petty officer, called the mess captain, is in charge of the mess, and all complaints by members of the mess must be made to this petty officer. He should then investigate the complaint and, if necessary, bring the complaint to the attention of the officer of the deck. The mess captain is responsible that proper order is kept, that food is not wantonly wasted, and that food is properly served. He should see that the mess cook keeps all his gear clean and his person also; that he has all the mess gear allowed and it is in good condition. If any question is raised by the mess cook about going to the galley for a second issue, the mess captain should hear what the mess cook knows about issues from the galley and should then give orders to the mess cook. The mess cook cannot refuse to obey orders from the mess captain.

Mess cooks should be particularly observed for symptoms of disease and signs of acute illness and instructed to report promptly at the sick bay for treatment if sick and to prevent the spreading of a contagious disease.

In large ships police petty officers are placed in charge of all messmen and they are responsible that the messmen carry out their duties. They inspect the messmen every day and inspect the mess tables and mess gear before every meal and see that the mess tables, mess gear, and the messmen themselves are clean.

Petty officers in most cases make recommendations for the choice of mess cooks; those recommended should be neat in appearance, industrious, and interested in their work. Dirty, unkempt mess cooks, battered and broken mess gear, and ill-kept mess compartments produce general discontentment in a ship. On the other hand, an efficient mess cook can justly take the greatest pride in his work, for no man of his rating in the ship does more than he for the comfort and contentment of his messmates. Furthermore, one efficient mess cook among a number of poor ones only stands out the more clearly because of their failure; all hands should willingly lend the mess cook a hand when he is overworked and he should be encouraged to be proud of the quality of his mess. The detail of mess cook should be presented to the men as one of pride and not one of punishment.

Precedence means priority in rank and preference in privileges. It must not be confused with *duty* or *responsibility*. Each rating and each branch has its own particular duties and responsibilities, and all ratings in all branches have certain military duties common to all men-of-war's men, as explained in the beginning of this course. But *precedence* has a different significance; it is an *order of preference* based on rank and length of service.

A coxswain is a petty officer of the seaman branch. Petty officers of this branch take precedence (order) according to the following classification:

Boatswain's mate, first class.	Boatswain's mate, second class.	Coxswain.
Gunner's mate, first class.	Gunner's mate, second class.	Gunner's mate, third class.
Turret captain, first class.		
Torpedoman, first class.	Torpedoman, second class.	Torpedoman, third class.
Quartermaster, first class.	Quartermaster, second class.	Quartermaster, third class.
Signalman, first class.	Signalman, second class.	Signalman, third class.
Fire controlman, first class.	Fire controlman, second class.	Fire controlman, third class.

In the case of two or more petty officers holding the same rate, the precedence is determined by the date of the rates; the man who has been longest in the rating takes precedence. If these rates are of the same date, then the man who has the greatest length of service to his credit takes precedence.

A chief petty officer takes precedence over a first-class petty officer.

Precedence of petty officers of the seaman branch and other branches.—There are four principal branches; seaman (line), artificer, aviation, and special.

As a rule petty officers of the artificer or other branches will not be assigned to divisions in which there are petty officers of the seaman branch. As far as possible aboard ship, the branches are kept separate, the senior petty officer of each branch taking precedence in his own compartment or part of the ship.

But if petty officers of the other branches should be assigned to divisions in which there are petty officers of the seaman branch, then the senior one of the seaman branch takes precedence in all matters pertaining to military control or command in his part of the ship.

Precedence of petty officers of all branches follows the same general rule as given above for the seaman branch; for example, a second-class petty officer, irrespective of his particular branch, takes precedence over a third-class. In the case of two or more petty officers holding a rating of the same class, the precedence is determined by the date of the rates; the man who has been longest in that class takes precedence. If these rates are of the same date, then the man who has the greatest length of service to his credit takes precedence.

A chief petty officer of any branch takes precedence over a first-class petty officer of any branch.

Responsibility in ship's boats.—In accordance with *Navy Regulations*, if line officers are in a boat, the senior one is responsible for her safety and management. Certain chief warrant and warrant officers are line officers, and the regulations which place the responsibility for boats upon commissioned line officers affect also chief boatswains and chief gunners, boatswains and gunners.

When the officer of the deck gives orders to the coxswain of a boat, these orders carry the authority of the captain. Of course, the captain and executive officer can at any time rescind them. If any other line officer gets into the boat, takes charge of it, and diverts it from duties previously assigned, this officer has a right to know what orders of his

seniors have not been carried out. The coxswain should request his permission to tell him.

In a ship's boat containing enlisted men only, the responsibility for the boat rests with the senior line petty officer (seaman branch), who is in full charge. For example, if special dangers to the boat or its passengers arise in the absence of any line officer authorized to take charge of the boat, it is the duty of the senior line petty officer in the boat to do so. With the exceptions above mentioned, other persons in the boat are passengers, and they are subject to the orders of the coxswain in matters that affect the safety and good order of the boat and its occupants.

CHAPTER 50

GROUND TACKLE

Handling anchors and chain 636
Mooring ship 641

HANDLING ANCHORS AND CHAIN

Windlass.—Anchor chain and anchors are taken in by means of an anchor windlass. This consists of an engine, either steam or electric, rigidly connected to a shaft, usually vertical, around the top of which is fitted a *wildcat*. The engine may be run in either direction and is controlled from the deck. The wildcat is a concave, vertical, drum-like contrivance with ridges around it, and these ridges are so shaped that they will engage the links of the anchor chain. The wildcat is so constructed that it may be either rigidly attached to the shaft or left free to rotate around it. On the lower end of the wildcat is a grooved braking surface, and braking effect is secured by screwing a friction band, fitting in the groove, up against this surface.

Above the wildcat there may be a concave metal barrel, called a capstan. This too operates either free or on the shaft. It is used for handling heavy weights, mooring lines, etc. On destroyers and small ships, the capstan has quadrilateral pockets around the top into which can be fitted wooden capstan bars. The capstan may then be turned by men pushing on the bars. Formerly this was the only means of handling anchors. At the bottom of the capstan are pawls which fall into notches in a pawl rim, secured to the deck, and prevent the capstan from turning backward. A capstan above a wildcat somewhat disguises the shape of the wildcat.

When a ship is riding to its anchor, the chain is secured with from one to three stoppers, the wildcat is disconnected from the shaft, and the brake is set up taut. Formerly there was also a controller near the bow. The links fitted over ridges in this, and the chain was thus prevented from running out if it jumped the wildcat. A deck stopper consists of a pelican hook and a turnbuckle inserted in a short length of chain. It is secured to a permanent pad on the deck. The stoppers augment the holding power of the brake; disconnecting the wildcat avoids possible damage to the anchor engine. This hook-up also facilitates *veering*, running out more chain when the anchor is already down. This

may become necessary in rough weather or under any circumstances which increases the danger of dragging.

Letting go.—Preparatory to anchoring, all but one of the stoppers are slipped, the brake is released so that the anchor is supported by the remaining stopper and, if there is a long space between the anchor and the wildcat, a few links of the cable are "roused up" on deck. If the ship is anchoring in deep water, the anchor may be "walked out" slowly by the engine. An order is given to stand clear of the chains, and it is very important that this be obeyed, because practically nothing will stop an anchor cable which parts, or whips, and there is a possibility that everything on the forecastle may be wiped clean. On the command to *Stand by* and before letting go, the toggle is taken out of the pelican hook and a man stands by with a sledge. On the order *Let go,* the pelican hook is knocked open with the sledge and, if necessary, the anchor is given a shove to start it. It is frequently necessary to give old-fashioned anchors a start, as they rest on the billboard and do not exert the pull on the chain that an anchor which is suspended by a stopper does. They are released by tripping a trigger on a retaining tumbler.

As the chain runs out, the amount, strain, and its angle relative to the bow are reported; as *Thirty fathoms on deck, sir; No strain; Chain tending slightly aft,* (*tend* is used with chain, as a verb, to state the direction of the chain relative to the bow), etc. In calm weather the amount of cable put out is usually equal to about 5 times the depth of the water. One anchor with a long scope (amount) of chain has better holding qualities than two anchors each with half as much chain, because a short scope causes a pull on the anchor which may loosen the flukes.

As a rule, a small *anchor buoy* is attached to the crown of each anchor by a light line. An anchor buoy indicates the actual position of the anchor to which it is attached by floating above it. Each buoy is usually painted a distinctive color, as green for starboard anchor, red for port anchor, and white for stem anchor. If an anchor buoy floats on the surface, it is said to be *watching.* An anchor buoy may fail to watch because its line is too short or is fouled in the chain or because the buoy itself is water-logged.

Before anchoring, the line which attaches the buoy to the anchor should be adjusted to a length which is a couple of fathoms greater than the depth of water at the anchorage. This extra length is to allow for slight fouling, variation of the tides, sinking of the anchor in mud, etc., which cause the actual depth to be greater than that shown on the chart. However, there should not be so much spare line on the anchor

buoy that it will be permitted to drift to some distance from the actual position of the anchor. The expected depth of water at the anchorage may be secured from the navigator. The anchor buoy and line must be laid up along, and outboard of, the life lines; it should be put overboard, or "streamed," well clear of the ship the instant the anchor is let go.

An anchor buoy is an invaluable timesaver in locating an anchor which has been lost in weighing or which may have been "slipped" in an emergency. *Slipping an anchor* is intentionally allowing either the bitter end of the chain or that section outboard of a disconnected shackle to run out. This is done when unforeseen circumstances do not permit time to take up the anchor.

Veering chain is often necessary when a storm comes up, and in some cases the coxswain in charge of an anchor which has to carry out this operation under the direction of the officer of the deck. When the anchor is secured after anchoring, the chain stoppers are secured to the chain, the wildcat disconnected, and the brake bands set up taut. To veer chain, first see that the wildcat is actually disconnected. Then see that the brakes are set up taut. Upon orders from the officer of the deck, let go all the chain stoppers. This is done by taking out the pin holding the link of the pelican hook in place and then knocking the ring off the pelican hook, which allows the hook to disengage the cable. The chain can now be veered by slacking up on the brake. If there is a heavy strain on the chain, great care must be exercised to veer only a little at a time so that the ship does not gather appreciable sternway; otherwise, when setting up on the brake, the chain cable may be put under an excessive strain or the anchor itself may be caused to drag. As soon as enough chain has been veered, set taut the brakes and put on all the chain stoppers. In putting on the stoppers set up on the turnbuckles equally so that each stopper carries the same strain.

Weighing anchor.—Prior to hoisting the anchor, the engine is warmed up, if of the steam type, and tested in any case. The wildcat is then engaged with the shaft, the brake released, a strain taken on the chain, and the stoppers cast loose. Before the time set for getting under way and after the main engines have been tested, the anchor is usually hove in to *short stay*, a condition in which there is no more chain out than is necessary to keep from pulling the anchor loose from the bottom. This is not done except on order of the officer of the deck, and he usually designates the amount of chain to be taken in, as *Heave-to to 10 fathoms*.

When ready to get under way, the anchor is hove in as ordered from

the bridge and the amount of chain out is reported to the bridge from time to time. Orders may be received to heave in to any number of fathoms or to heave right up. In any case, report is usually made when markers are at the water's edge—*Fifteen fathoms at the water's edge, sir,* when the anchor is at *short stay, up and down, aweigh, in sight,* and secured or ready for letting go. The anchor is *up and down* when the stock has been pulled up from the bottom, but the crown is still touching. The action of the chain signifies this condition of the anchor and it is judged either by the officer in charge of the forecastle or by the boatswain. With the report *Anchor in sight* goes one regarding its condition, as *Anchor in sight, sir; a clear (foul) anchor.*

As the chain comes in, a hose is played on it to remove mud, etc., and pressure on deck mains should be asked for ahead of time. Also, the markings are usually repainted, the old mark having first been wiped; each link is tested by striking it with a hammer. If a link rings it is all right, but if it sounds flat the first lieutenant or the boatswain should be notified immediately, although the flat sound may be caused by the link touching something or by its being dirty.

Care should be taken to remove all dirt from the chain. Play the hose on each link as it leaves the water and follow it as long as necessary, but without throwing spray on the forecastle. This cleaning helps preserve the chain and keeps dirt and odors out of the chain locker. Where the bottom is extremely muddy, it may be necessary to slow down the rate of heaving in, and this is preferable to dirty chain. Permission must be secured before slowing, however. Seamen frequently handle the hose, test the chain, and repaint the markings.

Stowage of chain.—As the chain comes aboard, it passes along the deck, on metal *flash plates* in large ships, over the wildcat, and down into the *chain locker.* Each chain goes into a bin and its *bitter end* is rove through a ring bolt at the bottom of this bin and is secured to the upper part of the bulkhead of the bin by a pelican hook. In the past, chain was tiered, fore and aft as a rule. This was done by men, called chain tierers, who caused the chain to settle in layers by pulling it with chain hooks (metal hooks with a toggle-like handle). With the advent of large chain and roomy lockers, tiering has practically been done away with.

Securing.—If the anchor is of the stockless type, it is housed in the hawse pipe and is secured in the same manner as a riding chain. The anchor must be drawn taut in the hawse pipe, by the outboard stopper, to prevent the flukes from banging against the sides. Stoppers are at-

tached to the chain by straddling a link with the tongue and link of the pelican hook, and the turnbuckle must be so adjusted that each stopper will take an equal strain. The cotter pin, or toggle, which keeps the pelican hook closed must then be inserted in the tongue of the pelican hook.

It is frequently necessary to block up the chain so that the stopper may catch a particular link. This is done to avoid large adjustments of the turnbuckle and is well worth while, because changing the set of a large turnbuckle is laborious and it is absolutely essential that a strain be taken by the stopper.

Rope stoppers are usually regarded as *deck stoppers;* stoppers having pelican hooks, but without turnbuckles, as *slip stoppers.* In the turnbuckle class, the outboard one is usually called the *housing-chain stopper* and those inboard of it *riding-chain stoppers.*

Deck winches, driven either by steam engines or electric motors, are found on all the larger ships and are used for hoisting boats, handling heavy lines, for mooring ship, warping, and coaling ship. These winches drive a horizontal shaft on which are drums or *gypsies. Every seaman, first class, and coxswain must know how the winches on his ship are operated and must be able actually to operate them.*

Deck winches driven by series motors may run so fast with no load as to tear themselves to pieces. They should be run only at moderate speed which can be accomplished by moving the controllers to the *off* position from time to time to allow the motors to slow down.

In painting deck winches, the utmost care should be taken not to allow paint to cover oil holes or to put it on gears, screw threads, or sliding or rubbing surfaces. Coxswains should detail careful, experienced men to cut in the working parts and the neighborhood of oilways with paint; a less skillful man can fill in the remainder. Paint will not stick to a greasy surface; it must be cleaned, first with kerosene, then with warm soapy water, finally with clean water.

Shackles must be frequently overhauled and kept in good working condition. A coxswain should know how to take out and put back the forelock pin in the U-shackles and the taper pin in the Kenter shackles. These pins have an annular ring at one end into which the lead keying ring is forced to hold the pins firmly in position. The spare Kenter shackles and detachable links should all be well greased. When assembling Kenter shackles and detachable links all machined surfaces must be well slushed with heavy grease or a mixture of 40 per cent white lead and 60 per cent tallow.

MOORING SHIP

A vessel in mooring uses two anchors separated at such a distance that her bow is held practically stationary in the line joining the two anchors. The vessel will swing around her stem as a pivot. The chief advantage of anchoring in this fashion is that a ship will swing in a much smaller space than if one anchor were down. Usually ships are moored in places where the channel is narrow and the tidal currents are strong.

Flying moor.—Whenever ships of the Navy moor, they nearly always do so by a maneuver called the flying moor. With the ship going ahead the first anchor is let go and, as the vessel ranges ahead and the chain is laid out, the engines are backed, the ship brought to a stop, and the second anchor let go. Then the chain to the first anchor is heaved in until the proper scope is out, the mooring swivel put on, and the operation is completed. Two methods of making a flying moor will be described.

(*a*) This method (Fig. 50-1) may be used where the time is limited prior to mooring. Assume the tide running ebb, with orders to moor with 45 fathoms of chain to each anchor. The ship steams slowly to the berth assigned and the lee anchor is let go. The lee chain is then veered as the ship forges ahead, laying out the chain. At the command from the bridge the second or riding anchor is let go when about 90 fathoms of lee chain is at the water's edge. The ship's headway is now stopped and the ship allowed to drift downstream; the lee chain is hove in and the riding chain veered until the 45-fathom shackles on both are a short distance abaft the forward chain stoppers. The ship will now ride to the last anchor let go. Wire preventers, as well as the forward chain stoppers, are now put on both chains. The *preventer,* as its name implies, is to prevent possible loss of the chain end while it is unshackled. One section of the crew unshackles the riding chain at the 45-fathom shot, and shackles on the mooring swivel, cup aft. As soon as the swivel is on, the strain of the chain is taken on the anchor engine, the chain stopper and preventer are removed, and the riding chain veered until the swivel is just abaft the hawse pipe. In the meantime another crew on the lee chain has placed on it a clear-hawse pendant, and then unshackled the chain. The *clear-hawse pendant* is to prevent the lee chain from becoming fouled with the riding chain. A *dip rope* which has been rove off previously, out through the lee hawse pipe, around the bow, and in through the riding hawse pipe is shackled to the end of the lee chain. An easing-out line is made fast around the bight of this chain. The *easing-out line* is to ease out the bight of the lee chain, because due to

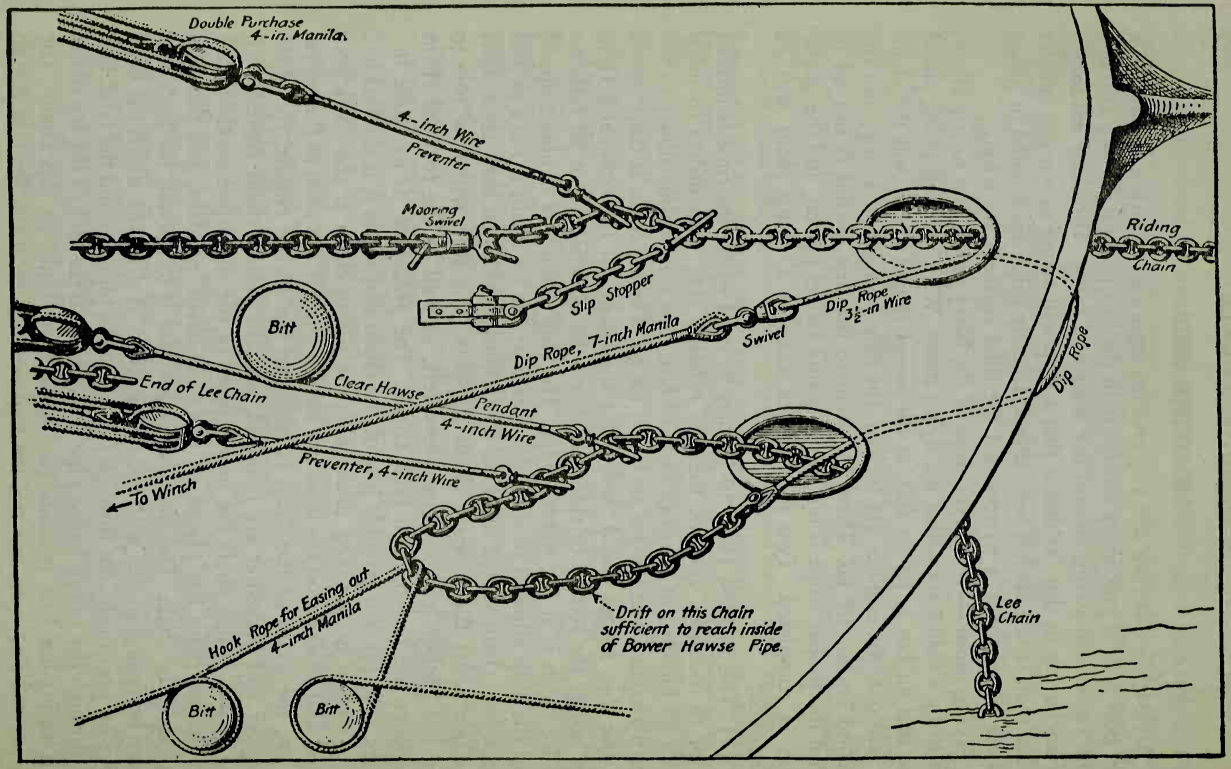


FIG. 50-1—Mooring and putting on swivel, first method (courtesy of D. Van Nostrand Company, Inc.).

its heavy weight it would otherwise surge out the hawse pipe with great violence, and possibly do damage to the ship, chain, or mooring gear. (See Fig. 50-1 which shows all lines and chains in the positions just described with the exception that the riding chain has not as yet been veered.) The lee chain is hauled around by the dip rope, the bight of the chain being eased out simultaneously. This chain is thus kept under control and the heavy surge on the clear hawse pendant which would result from letting the bight go out on the run is avoided. The lee chain, having been hauled inside, is now shackled to the mooring swivel. The pelican hooks of the clear hawse pendant and preventer are now knocked clear of the lee chain, allowing the strain to be taken on the riding chain, after which the swivel is veered outside. All gear is then secured.

(*b*) In this method (Fig. 50-2) the order of letting go the anchors, unshackling the chains, and putting on the mooring swivel is the same as in method (*a*) ; however, the work of shifting one chain to a position adjacent to the other, where it may be shackled to the mooring swivel, is done in advance of letting go the anchor. Figure 50-2 shows a deck view of both chains leading out the same hawse pipe in advance of mooring ship. In this case the anchor on the bight of chain is always let go second, so that it will be the one to tend ahead, and be the riding anchor during the shackling of the swivel. In starting to prepare for this method, both anchors must be backed out clear of the hawse pipes prior to shifting the chain. The gear used is identical with that used in method (*a*) and by means of the dip rope the end of the bight of chain is brought around and up through the other hawse pipe, where it is reshackled to its own part which has been placed in a position leading across the deck. *The great advantage of this method is that it provides for doing most of the work required in advance of the time of actual mooring.*

Foul hawse.—It is the almost universal practice in the Navy to use a mooring swivel when mooring a ship. The use of this usually prevents a foul hawse. If for any reason it is not desirable or is impossible to use a mooring swivel, a foul hawse will result if the ship swings around in the same direction so that the cables cross. It is evident that if the ship can be made to swing the same number of turns in the opposite direction, the cables will clear. This is not always possible and the cables have to be cleared from the ship. It then becomes a problem of taking out the turns. Slack water is chosen for this job. One way of doing the job is to secure the lee chain on deck by stoppers. Rouse out enough chain to reach around the riding chain as many times as there are turns in the

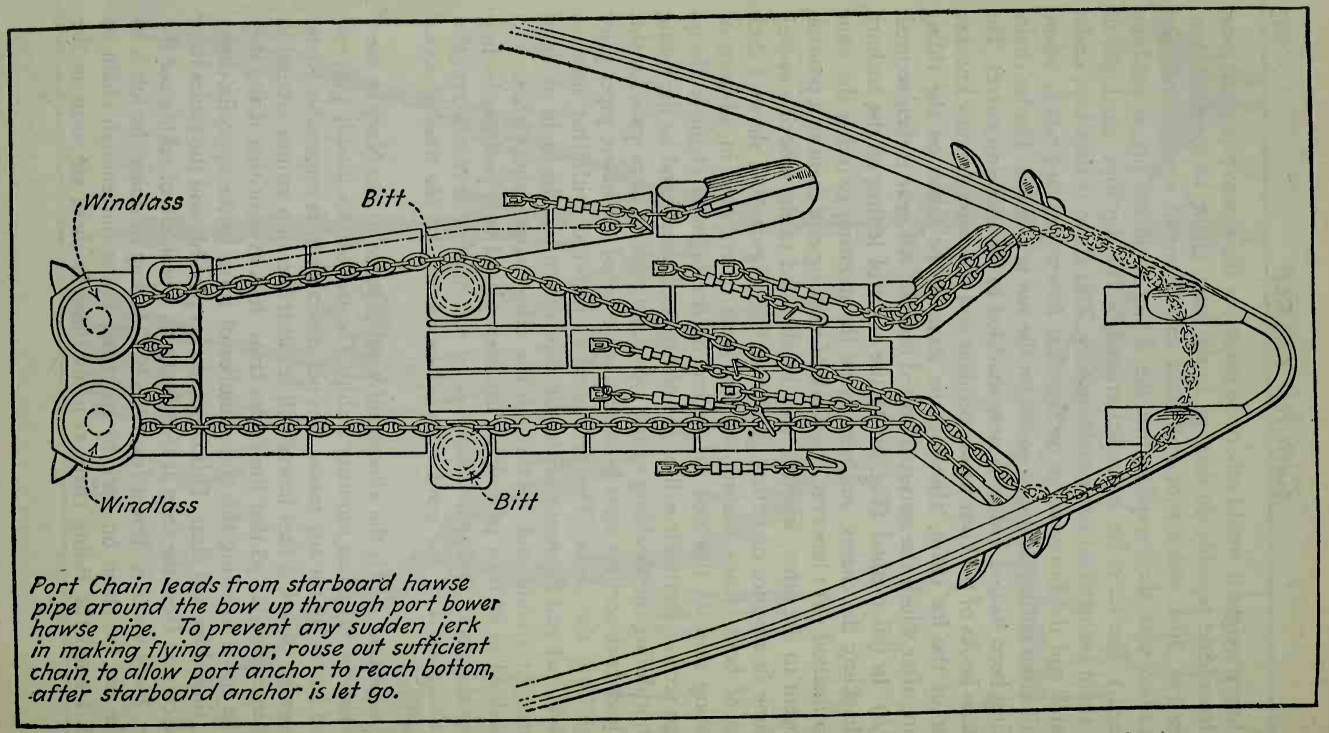


FIG. 50-2—Mooring and putting on swivel, second method (courtesy of D. Van Nostrand Company, Inc.).

foul hawse, and then back again on deck. A dip rope is rove around the riding chain in the proper direction for clearing. The lee chain is then unshackled and the dip rope is hooked to the end link of the outboard part of the lee chain and hauled taut. The bight is then eased out by an easing-out line. As the chain is eased out, it is lightened around by a hook rope while the dip rope takes in the slack. As soon as enough slack is on deck to shackle up, the lee chain is again shackled up. It is then hove in by the windlass until it is clear of the riding chain.

Very little trouble need be expected from fouled cable with the present ground tackle found in the Navy. Such trouble as may arise can usually be corrected with the judicious use of a jigger and pinch bar.

CHAPTER 51

SMALL ARMS; DETAILS OF INDIVIDUAL AND COLLECTIVE FIRING

COXSWAINS must know all of Chapter 42, Part III, in addition to this chapter. Chapter 42 gives in detail the part of the rifle and pistol used in the Navy and detailed instruction in positions, aiming, and firing.

DETAILS OF INDIVIDUAL AND COLLECTIVE FIRING

Notes on winds.—The wind sweeps the bullet with it to the right or left and to a varying extent, depending upon the range, the time during which the bullet is in flight, and the strength and direction of the wind. The horizontal clock system is used in describing the direction of the wind. The firing point is considered as the center of the clock and target is at 12 o'clock. Winds from ahead are 12 o'clock winds; from astern, 6 o'clock winds; from the right at right angles to the line of fire 3 o'clock winds. A wind that is frequently changing its direction back and forth from right to left is called a *fishtail* wind.

The worst kind of a wind in which to shoot is a fishtail wind at 12 or 6 o'clock.

Correcting for wind.—The rear sight is moved against the wind an amount calculated to compensate accurately for the effect of the wind. Thus, for a 3 o'clock wind the sight is moved to the right; for a 9 o'clock wind to the left; for a 6 o'clock wind the elevation may be slightly decreased, for a 12 o'clock wind, slightly increased. Before the correction can be made, however, the zero of the rifle must be known. This can best be accomplished on a calm overcast day when there is no wind to deflect the bullet and no sun to cast disturbing shadows on the sight. If after careful trial the center of the target is hit when the wind is set at, say, ½ left, then this is the zero of the rifle. This point must be noted, and becomes the point from which all corrections are made. Thus if the zero is ½ left and the wind calls for a correction of ½ right, the wind gauge will read zero when set for the correction. If the wind calls for ½ left, however, the wind gauge will read 1 point left when the correction is applied. The zero is never great enough to throw the shot off the target but it must be known for fine shooting.

The windage rule.—If the direction of the wind is determined by a clock or flags and its velocity by an anemometer, and if these two factors are determined at points in path of the bullet, the wind to be allowed for can be determined by the wind rule. The range in yards multiplied by the velocity of wind and divided by 1,000 equals the number of quarter points to allow for a 3 or 9 o'clock wind. Example: At 500 yards the wind is blowing 8 miles an hour from 3 o'clock. Then $\frac{500 \times 8}{1{,}000} = 4$ quarter points, or 1 point windage. The sight should be set with 1 point right windage for the first shot.

Note.—The wind correction as determined by this rule is for use with the 150-grain bullet (1906 or M2 ammunition). For the 173-grain bullet (M1 ammunition), the wind correction is about ½ that given above.

The quarter point rule for changing windage (how to change windage in slow fire after hitting the target).—Changing the windage ¼ point moves the bullet 1 inch for every 100 yards of range. For example:

¼ point at 200 yards, moves the bullet 2 inches on the target.

¼ point at 300 yards moves the bullet 3 inches on the target.

¼ point at 400 yards moves the bullet 4 inches on the target.

¼ point at 500 yards moves the bullet 5 inches on the target.

¼ point at 1,000 yards moves the bullet 10 inches on the target.

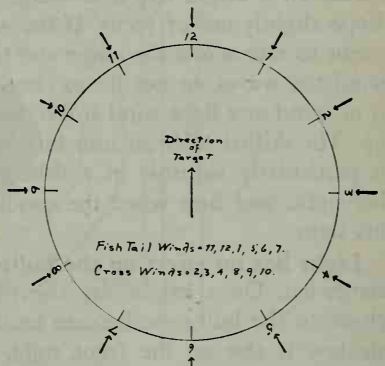


FIG. 51-1—Winds.

The square rule for changing elevation (how to change elevation after hitting the target).—Changing the elevation 100 yards at any range moves the hole in the target a distance in inches equal to the quotient of the square of the range divided by the square of the change in elevation.

Changing the elevation 100 yards at any range gives change on the target equal to the number of inches on the square of the range.

Example: At 200 yards, changing the elevation 100 yards gives 4 inches change on the target; at 300 yards, 9 inches; 500 yards, 25 inches; 600 yards, 36 inches; 1,000 yards, 100 inches.

This rule is not exact, but it is close enough for all practical purposes.

Do not make changes in windage or elevation boldly. Make a little less change than the rule calls for. In practice, changes seem to carry the bullet more than expected. Change cautiously. In case of doubt, favor the smaller change, and unless quite sure of the hold or pull, or unless changes in condition suggest it, do not change for one shot a little off.

Always aim the same way and control the point of hit by changing elevation and windage.

The effect and use of mirage.—This so-called mirage is really not a mirage at all, but rather the heat waves that rise off the earth. The mirage itself has no effect on the bullet. Its only effect in sighting is to displace the apparent position of the bull's-eye somewhat, through refraction. Its great value is in indicating the force and direction of the wind. In a high wind or on a dull day it is not apparent. In a light breeze on a bright day it is easily visible, particularly through a telescope slightly out of focus. If the wind is blowing briskly, the mirage seems to race across the range and to lie close to the ground. In a light wind the waves do not lie so close nor travel so rapidly. When there is no wind or a light wind at 6 o'clock, the mirage seems to boil straight up. The skilled rifleman uses this indicator to the utmost, and he finds it particularly valuable in a fishtail wind, when he watches it along his sights and fires when the conditions are the same as when he set his sight.

Light has no effect on the bullet, but it influences the point of aim somewhat. On a bright day the rifleman unconsciously holds a little closer to the bull's-eye because he can see it more clearly. Again, if a shadow is cast on the front sight, the rifleman may not see it well enough to center it properly in the peep. The influence of light is not sufficient to trouble anyone but an expert, even when the changes are quite marked. In training new men at short and mid range, it is best not to mention the effects of temperature, humidity, barometer, light, and mirage and to concentrate on the subject of wind and the mechanical operations of sight setting.

Finding the target at short ranges is ordinarily a simple process of setting the sight at the mark shown for the given range, and for zero wind. At long range, if the target is not hit, the trouble is most likely to be found in elevation, because errors in estimating the wind are not likely to carry the shot off the target. To find the target, the first step is to set the sight as nearly as possible to the estimated ele-

vation required. If the rifle has never been sighted in at any other range so that no estimate can be made, then the sight should be set at the mark corresponding to the given range. If the first shot misses, the elevation should be increased by 50 yards. If the second shot misses, the elevation for the first shot should be decreased by 50 yards, and so on, alternately increasing and decreasing the elevation by 50-yard increments from the original elevation.

Targets.—Figure 51-2 shows the target used for pistol firing. For the marksman's course target A is used, which has a 20-inch bull's-eye. The inner 12-inch bull counts 5, the remainder of the bull 4, the inner circle 3, the outer circle 2, and the remainder of the target 0.

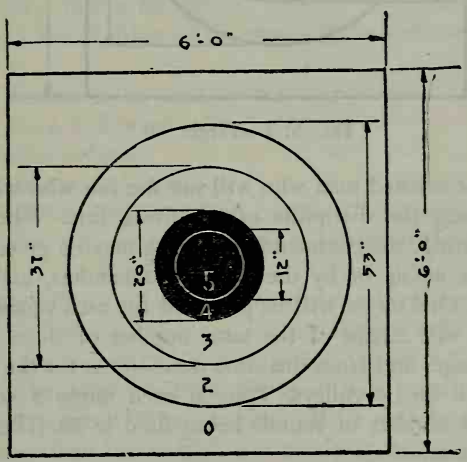


FIG. 51-2—Pistol target.

Figure 51-3 shows the target used for the sharpshooter's and expert's courses. It is the same size as Fig. 51-2. A hit in the bull counts 5, in the inner circle 4, outer circle 3, and the remainder of the target 2. A hit within the 12-inch circle in the bull is scored as a V, which is the same as 5 but is used for breaking ties. Thus, if two riflemen both made perfect scores, the one having the most V's is the winner.

Collective fire.—The object is to give officers and petty officers experience in controlling and directing fire, and to give officers and men experience in fire discipline.

Collective fire will be held by squads of exactly 8 firers, or by groups of such squads firing simultaneously. Each squad will be commanded

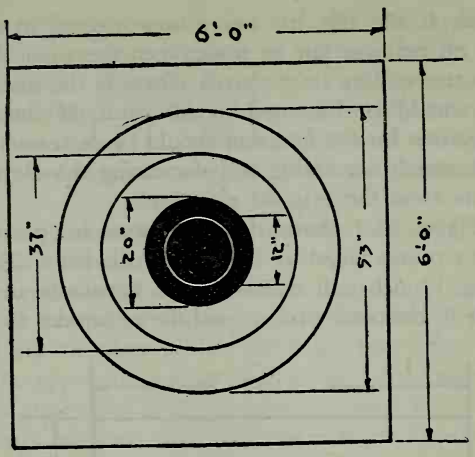


FIG. 51-3—Target "B."

by an officer or enlisted man who will not fire but who will be charged with maintaining the discipline of the firing line. When more than one squad is firing, the commands for firing may be given by the commander of the whole or by the squad commanders, as the officer in charge directs. One target will be provided for each squad.

The course will consist of the same number of shots for each man at the same ranges and from the same positions as for the skirmish run. The firing will be by volleys. Thus at each range 5 volleys will be fired, the total number of rounds being fired is 20. There is no time limit. The commands are:

1. *Fill magazines, load, and lock. Forward, MARCH.*

2. *Halt; lie down. 500 yards; windage. Set your sights; unlock pieces. At your own target, squad aim; FIRE. Squad aim, FIRE* (until 5 volleys have been fired). After each volley the firers reload from magazines without command.

3. *Fill magazines, load, and lock. Forward; double time; MARCH.*

CHAPTER 52

SIGNALS, BOAT AND SHIP

Lifeboat signals.—(1) A lifeboat lowered to pick up a man may be directed by the following signals:

Numeral 1 flag, pull to right of the line looking from ship to boat.

Numeral 2 flag, pull to left of the line looking from ship to boat.

Numeral 3 flag, pull directly away from the ship.

Numeral 4 flag, pull directly toward the ship.

Numeral 8 flag, return to ship.

(2) By night the position of the man will be indicated by a searchlight beam.

(3) Night signals to be used by the lifeboat are:

White star, have picked up man.

Red star, need assistance.

Green star, cannot find man.

Boat calls.—This should not be confused with recall. This signal is hoisted for the purpose of sending a message to the boat. *The call for ship's boats is the flag Easy.*

The complete call of a boat consists of the call of the ship over the E flag, over the boat's number, as for the *New York* (whose call is B 34) to call the *Arizona's* (B 39) first dinghy (E 39) (the boat's call number), the *New York* would hoist B 3 pennant, 9 pennant, E 3 pennant, 9 pennant. The complete call is necessary when a ship calls a boat other than her own. When a ship is calling her own boats, the ship's call may be omitted, the call in this case being E 3 pennant, 9 pennant. The E alone calls all of the boats of that ship.

For uniformity, boats are assigned numbers as follows:

E 1 pennant	Admiral's barge.
E 2 pennant	Chief of staff's barge or gig.
E (3 to 5) pennant	Staff gigs or motor boats.
E 6 pennant	Captain's gig.
E (7 to 10) pennant	Motor boats.
E (11 to 22) pennant	Motor launches.
E (23 to 26) pennant	Motor whaleboats.
E (27 and 28) pennant	Cutters.
E (29 to 38) pennant	Whaleboats.
E (39 and 40) pennant	Dinghies or wherries.
E (41 and above) pennant	Miscellaneous.

A division call over *Easy* calls all small boats of that division.

A squadron call over *Easy* calls all small boats of that squadron.

Caution.—*The coxswain should acquaint himself with the recall and call of his boat.* A small diagram showing the hoists for boats is usually placed in every boat.

Boat recall.—The 8 flag hoisted alone is *general recall* for all boats away from ship. The Morse equivalent of this signal is 8 *long dashes.*

Under the call of a boat, this signal is recall for boat indicated.

Preceded by negative and by the call of the boat, it directs the boat not to return until recalled.

The guard flag is zero flag. It is flown at foretruck from sunrise to sunset by ships having guard duty. It is also flown in bow of small boats performing guard-boat duty (including guard mail trips).

Explosive flag.—This is the flag Baker. It is hoisted at the foretruck when handling ammunition, fuel oil, or gasoline in large quantities. It is also displayed in the bows of all boats and lighters transporting same. It is hoisted at foretruck of firing and towing ships during target practice.

Hoisted at the yardarm at the dip, it indicates that the ship is off the range or not ready for firing.

Absentee pennants.—

Pennants	Flown (at anchor)	Absentee denoted
1st REPEAT	Starboard yardarm ..	Official or naval officer whose personal flag or command pennant or S.O.P. pennant is flying in this ship, is absent with intention to return within 72 hours.
2nd REPEAT	Port yardarm	Chief of staff is absent with intention to return within 72 hours.
3rd REPEAT	Port yardarm	(*a*) Captain is absent with intention to return within 72 hours; or, (*b*) (The captain being absent without intention to return within 72 hours.) The executive officer is absent with intention to return within 72 hours.
SPEED	Beneath personal flag or broad command pennant.	Official or naval officer beneath whose personal flag or broad pennant SPEED is displayed will leave the ship officially in about 5 minutes. SPEED will be hauled down at the moment of his departure.

Signals of the Coast Guard for wrecks, etc.—Upon the discovery of a wreck by night, the life-saving force will burn a red pyrotechnic light or a red rocket to signify *You are seen; assistance will be given as soon as possible.*

A red flag waved on shore by day, or a red light, red rocket, or red Roman candle displayed by night, will signify *Haul away.*

A white flag waved on shore by day, or white light slowly swung back and forth, or a white rocket or white Roman candle fired by night, will signify *Slack away.*

Two flags, one red and one white, waved at the same time on shore by day, or two lights, one red and one white, slowly swung at the same time, or a blue pyrotechnic light burned by night signify *Do not attempt to land in your own boats. It is impossible.*

A man on shore beckoning by day, or two torches burning near together by night, signify *This is the best place to land.*

Pyrotechnic material.—*The rocket* is the most commonly used form of pyrotechnics in signaling and sometimes for illuminating purposes. It is in effect a projectile containing a composition which, as it burns, generates sufficient gas which escapes at the base and drives the rocket forward by its action against the air. The same principle is involved as that of a gun in recoil. The rocket case is always cylindrical, generally formed of pasteboard covered with tin, partly filled with a driving composition and, for military uses, a bursting charge to be set off at the end of the flight for expelling the signaling contents, either stars, shower, smoke, or illuminating material. The case is given a certain fixed amount of choke in order to get the proper gas discharge. The action of the gases, compressed within the gas chamber of the rocket, is downward, thus making the course of the rocket upward. A stick or staff is always attached to the rocket to give it stability in flight. It acts as a counterbalance against the weight of the rocket. Light wood is used, generally pine. The end attached to the rocket should be square in section and of a thickness equal to one-half of the diameter of the rocket, tapering toward the tail to one-fourth of this size. The length and balance of the stick has an important effect on the flight, as the longer it is made the more nearly vertical the flight. The rocket with stick attached should be balanced about two case diameters from the lower end of the rocket body. Care should be taken to see that the stick is securely fastened to the rocket to insure a good flight. A rocket should be at an angle of 70 degrees to the horizontal when firing. A rocket with the proper length of stick and with the proper balance

when fired at an angle of 70 degrees to the horizontal will attain a height of approximately 800 feet.

Rockets are put up for issue to the service with the body wrapped in wax paper to which is attached a tearing string for opening. To each tearing string is attached a tag to indicate the color of the material discharged by the rocket, either stars, smoke, or showers. These tags are also shaped in order to indicate the color by feel so that no mistake will be made in darkness.

The heads of the rockets are also closed with wooden tops which are shaped to indicate the color. Figure 52-1 shows the method of packing and the shapes for indicating the colors.

The base of the rocket body is covered with a paper seal to keep

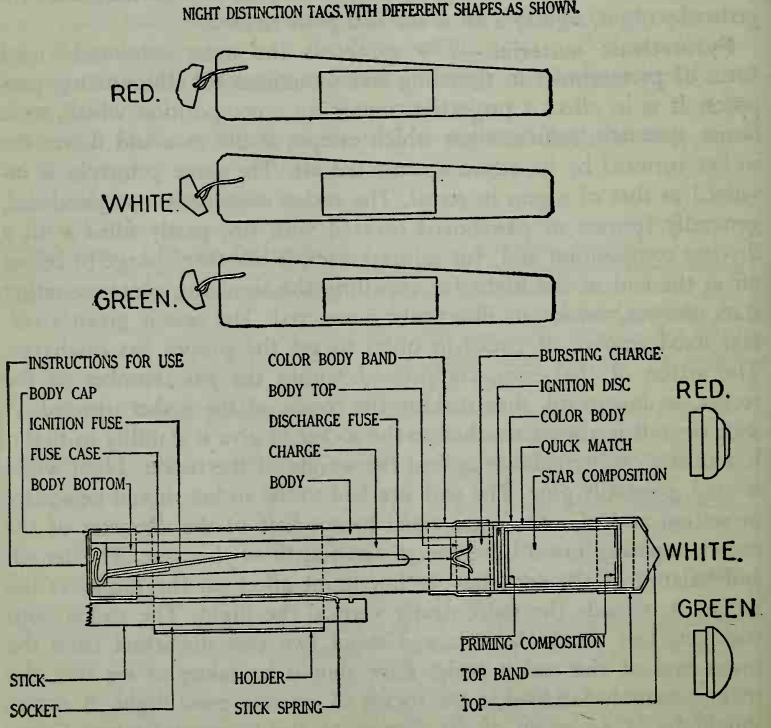


FIG. 52-1—Rocket.

out the moisture. On this seal are printed instructions for use. The fuze or quick match for igniting the rocket is under this seal; to get the rocket ready for firing, break the seal and let the quick match drop out so that it may be ignited.

Very signals.—In addition to the rocket, signal cartridges are issued for use in the Very's pistol. This pistol (Fig. 52-2) is designed to take a 10-gauge, center-fire, brass-headed, paper, shotgun shell. The

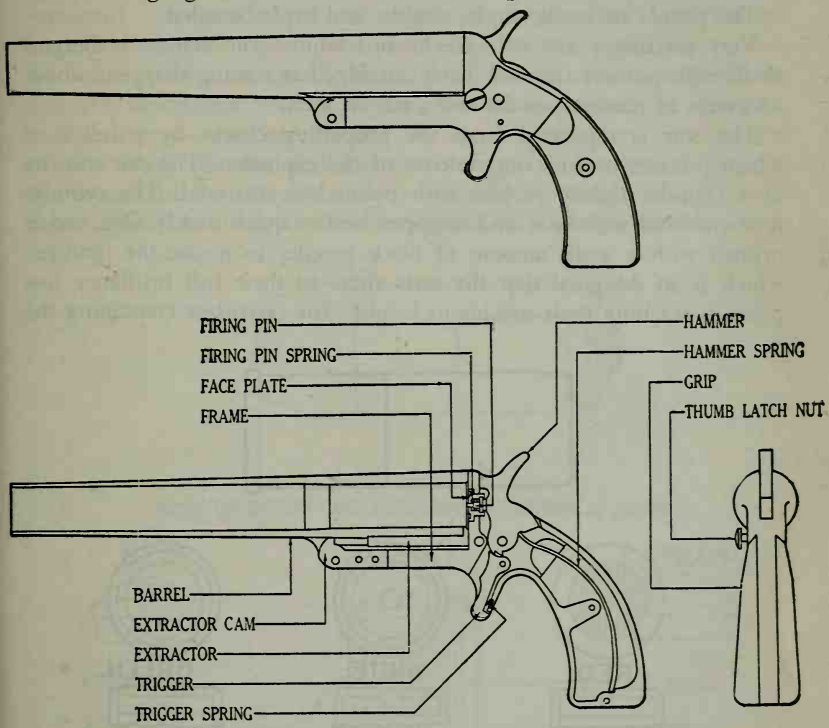


FIG. 52-2—Very's pistol.

pistol is a simple single-loading one, with a steel barrel about 9 inches long tapered at the muzzle. A lug on the under side is recessed for the extractor and arranged to fit in the hinge plate of the frame. The handle is bronze with two walnut sides. The frame is an irregular-shaped piece of bronze to which the other parts are attached. The firing mechanism consists of the trigger, trigger spring, hammer, mainspring, base plate, firing pin, and firing-pin spring. The extractor, a steel cylin-

der, fits into a recess in the lug of the barrel, and has a lug on its rear face which catches the rim of the cartridge as the barrel moves around the hinge pin. To operate, press in the barrel catch and break open the barrel by pressing it down. Insert the cartridge and return the barrel to its original position. Be sure the barrel is locked closed.

Precaution.—Never fire a Very star in a shotgun or a shotgun cartridge in a Very's pistol.

The pistols are made single, double, and triple barreled.

Very cartridges are red, green, and white. The standard shotgun shells with primers are used. Each cartridge has a firing charge of about 25 grains of musket powder and a star of stars.

The star is separated from the propelling charge by a felt wad which protects it from the violence of the explosion. The star consists of a cylinder tightly packed with pyrotechnic material. The cylinder is re-enforced with wire and wrapped with a quick match. One end is primed with a small amount of black powder to insure the ignition, which is so designed that the stars come to their full brilliancy just prior to reaching their maximum height. The cartridges containing the

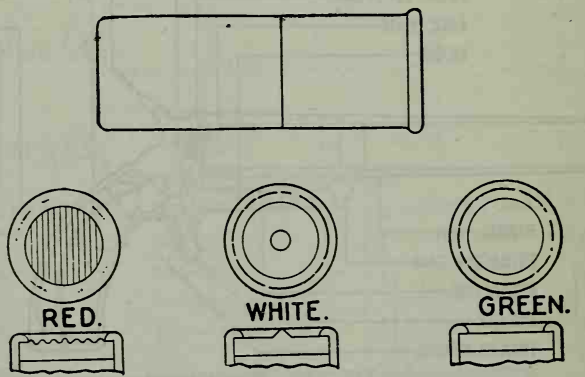
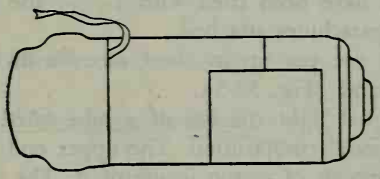


FIG. 52-3—Very cartridge.

different colored stars may be distinguished by the color and the surface of the wad in the end (see Fig. 52-3).

The stars are packed 12 to a cardboard box, each star in a separate compartment. The boxes are wrapped with paper and shellacked to keep out the moisture. These Very signals are an emergency signal and should be kept in good condition. The pistol and ammunition are usually issued for use on the bridge while at sea. This ammunition should be frequently inspected to make sure that the shotgun shells have not become wet and too large for the pistol. This often happens when a box has been opened and partly used. Any partially used box should be carefully rewrapped with paper and shellacked to keep out moisture.

Rifle lights.—Another method of signaling is offered by the use of rifle lights. A special discharger is required, designed to fit over the muzzle of the rifle and lock in place by a bayonet joint over the front sight. The firing charge is contained in a special blank cartridge



NIGHT DISTINCTION CAPS, WITH DIFFERENT SHAPES, AS SHOWN.

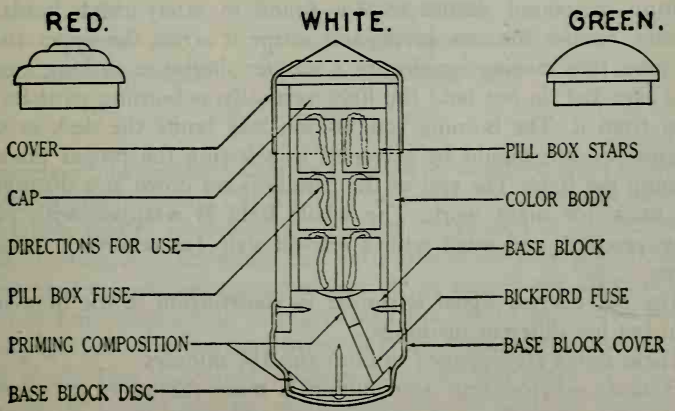


FIG. 52-4—Rifle light.

which is fired from the lock in the usual manner. Gas from the blank cartridge ejects the rifle light from the discharger. As the recoil is excessive, the rifle should be rested on the deck or ground and held at the desired angle of elevation, usually about 70 degrees. The discharger will fit any service rifle, and should the special blank cartridge not be available, a service blank may be used, but will give less range than the special cartridge. Never use a service cartridge with a bullet for discharging a rifle light.

The rifle light (Fig. 52-4) consists of a cardboard tube with base and head plug, and contains 12 stars of either red, white, or green color. On discharge the priming composition in the base plug ignites the fuze which is so timed that it will light off an additional amount of priming composition and eject the stars from the tube as it reaches the top of its trajectory. As with rockets, the color of the paper and the shape of the head plug denotes the color of the stars. Special types of these lights have been tried with 1-, 3-, and 6-star combinations, and also with parachutes attached.

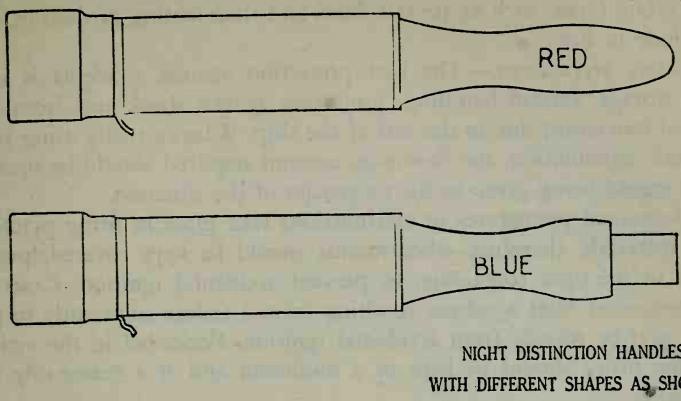
Signal lights are put up in short tubes with wooden handles for use from the hand (Fig. 52-5).

The blue signal light consists of a tube fitted with a handle and containing a special composition. The upper end is closed by a cover with a small amount of cotton inside of it. The outside of this cover is coated with a substance similar to that found on safety-match boxes for igniting safety matches. The burning composition at the upper end of the tube is covered with a piece of cloth impregnated with an igniting compound similar to that found in safety-match heads. To operate, remove the cap, invert and scrape it across the upper end of the tube, thus causing ignition in a manner similar to striking a match on a box, but do not hold the light vertically as burning particles will drop from it. The burning composition may ignite the deck or other articles, so care should be exercised in selecting the proper place for burning the light. The end of the handle is cut down as a distinguishing mark for night work. The whole light is wrapped with paper, water-proofed, and fitted with a tear-off strip for removing the outer cover.

The red distress signal is similar in construction to the blue signal light but has different markings.

These lights are designed to burn for 2½ minutes.

Hazards.—Pyrotechnic ammunition is more subject to deterioration than some other types of ammunition, and some types are liable to



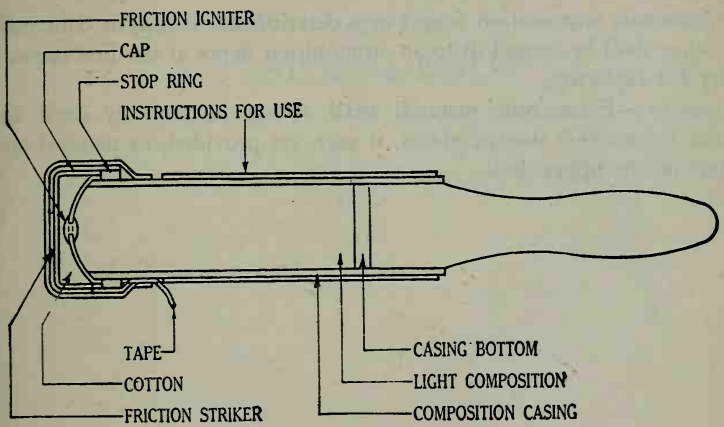


FIG. 52-5—Signal lights.

spontaneous combustion if they are exposed to moisture, high temperatures, or rough handling. Certain types of rockets have a box of matches or a match igniter assembled along with the round; to prevent accidental ignition it is important that such articles be packed and stored so that they cannot rub against each other or against any other object.

Pyrotechnic ammunition is in general a fire hazard and causes a very hot fire difficult to extinguish. Most all types furnish their own oxygen upon combustion, but large volumes of water may serve to cool the materials, or at least adjacent materials, below the ignition temperature.

Certain types, such as aircraft flares and illuminating projectiles, may explode in fires.

Safety precautions.—The best protection against accidents is cool, dry storage, careful handling, protection against shock and from continual movement due to the roll of the ship. When actually using pyrotechnic ammunition, the minimum amount required should be opened, due regard being given to the exigencies of the situation.

Occasional prematures or malfunctions take place in firing pyrotechnic materials, therefore other rounds should be kept covered, preferably in fire-tight containers, to prevent accidental ignition. Cases are on record of fatal accidents resulting from a failure sufficiently to protect near-by rounds from accidental ignition. Personnel in the vicinity of the firing should be kept to a minimum and at a reasonably safe distance.

Pyrotechnic ammunition found in a deteriorated, damp, or damaged condition shall be turned in to an ammunition depot at the first opportunity for replacing.

Stowage.—Pyrotechnic material shall always be kept by itself in regular pyrotechnic storage places, if such are provided, or pyrotechnic lockers on the upper deck.

PART FIVE

PHYSICAL DRILLS

CHAPTER 53

PHYSICAL DRILLS WITHOUT ARMS

General 663
Starting positions of the arms 664
Starting positions of the legs 666
Starting positions of the trunk 669
Miscellaneous starting positions 670
Combined starting positions of the arms and legs 672
Leg exercises carried out from the starting positions 673
Arm exercises carried out from the starting positions 674
Neck exercises carried out from the starting positions 678
Trunk exercises carried out from the starting positions 679

GENERAL

Formations.—(*a*) The following formation is recommended for physical drill, it being the simplest and least complicated and more compact than any other. The unit to be drilled is formed in column of threes or fours at close interval facing the instructor. In restricted spaces, as on board ship, it may be formed in column of twos.

(b) At the command 1. *Extend to the left,* 2. *MARCH,* the right squad (file) stands fast, with arms extended sideward. The second, third, and fourth squads (files) from the right turn to the left and, taking up the double time, run forward to the original left, the second squad (file) taking 2 paces, the third taking 4 paces, and the fourth taking 6 paces. All face to the front after taking the required distance, with arms extended sideward, the distance between the finger tips to be about 12 inches.

(c) At the command 1. *Arms,* 2. *DOWN,* the arms are lowered smartly to the sides. The men within each file are now covering in column at 40 inches distance and are too close to carry out the exercise.

(d) At the command 1. *Even numbers to the right (left),* 2. *MOVE,* each even-numbered man stride jumps to the right, squarely in the middle of the interval. In doing this he swings his right leg sideward, jumps from his left foot, and lights on his right foot, bringing the left smartly into position against the right.

(e) To assemble, the instructor commands 1. *Assemble,* 2. *MARCH.*

At the command *MARCH* all return to their original position in column on the double.

General.—All movements hereinafter described should be first carefully explained, laying stress upon their principal objects.

The instructor should then illustrate each position or exercise until it is thoroughly understood by the class.

Starting positions.—(1) After executing the starting positions by command, they may be repeated as many times as desired by giving the caution *By the numbers,* and then substituting, for the commands of execution given the first time, the numbers *ONE, TWO, ONE, TWO,* and so on, or *ONE, TWO, THREE, FOUR, ONE, TWO, THREE, FOUR,* and so on, as appropriate.

(2) When movements are executed to both left and right, sufficient numbers are used to complete the movement to both sides.

(3) For common faults in the combined starting positions of the arms and legs, see the references indicated.

Exercises.—(1) In conducting exercises, the starting position is taken on command; each movement is then executed on command; each movement may then be repeated by giving the caution and numbers as in (1) above.

(2) When an exercise is executed to both sides, it should be first conducted to the left and then repeated to the right.

(3) When an exercise is not completed in the standing position, the standing position is resumed on command.

(4) For common faults, see the references indicated.

The standing position.—(*a*) The standing position is the position of attention (see Chapter 6). It is taken at the command *ATTENTION,* or as hereinafter prescribed.

(b) The position of attention is a very important one as all exercises start from it. Instructors should criticize the position of attention with such remarks as *head up, chin in, chest high, knees straight,* etc.

STARTING POSITIONS OF THE ARMS

Wing standing position.—(*a*) *Command.*—1. *Hips,* 2. *FIRM.* Arms are bent upward; hands placed on the hips; fingers to the front, thumbs to the rear; palms of hands turned inward and pressing against the ridge of the hip bone; elbows pointing out to the side and slightly drawn back.

(*b*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.* Arms are stretched downward with force the shortest way.

(*c*) *Common faults*—(1) Elbows drawn back too much and not pointed to the side.

(2) Hands not firm on the hips.

Yard standing position.—(*a*) *Command.*—1. *Arms sideways,* 2. *RAISE.* Arms, fully stretched, are slowly raised sideways to the horizontal; thumbs and fingers extended and joined; palms turned downward.

(*b*) *Standing position, command.*—1. *Arms downward,* 2. *SINK.* Arms are slowly lowered sideways to the sides.

(*c*) *Common faults.*—(1) Arms not held in the horizontal position.

(2) Chest relaxed and not held high.

Reach standing position.—(*a*) *Command.*—1. *Arms forward,* 2. *RAISE.* Arms, fully stretched, are slowly raised forward to the horizontal; thumbs and fingers extended and joined; palms turned inward toward each other.

(*b*) *Standing position, command.*—1. *Arms downward,* 2. *SINK.* Arms are slowly lowered forward to the sides.

(*c*) *Common faults,* in addition to those in Yard Standing Position, palms not turned inward.

Bend standing position.—(*a*) *Command.*—1. *Arms,* 2. *BEND.* Arms are bent up quickly at the elbows; palms toward the shoulders; fingers touching the points of the shoulders; elbows drawn back and down to the sides.

(*b*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.* Arms are stretched down to the side with force the shortest way.

(*c*) *Common faults.*—(1) Shoulders not back and square to the front.

(2) Elbows not drawn in to the sides.

(3) Fingers not resting on the shoulders.

Forward bend standing position.—(*a*) *Command.*—1. *Arms forward,* 2. *BEND.* Arms are bent quickly upward in front of the chest; elbows at the height of shoulders and drawn well back; thumbs and fingers extended and joined; palms down; wrist and forearm in a straight line.

(*b*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.* Arms are stretched down to the sides with force the shortest way.

(*c*) *Common faults.*—(1) Elbows not at height of shoulders and not drawn back enough.

(2) Shoulders carried forward.

(3) Wrist and forearm not in a straight line.

Stretch standing position (Two methods).—(*a*) *Command.*—(1) 1. *Arms forward and upward,* 2. *RAISE.* Arms, fully stretched, are raised forward and upward to the vertical position; palms turned inward shoulder width apart; thumbs and fingers extended and joined.

(2) 1. *Arms sideways and upward,* 2. *RAISE.* Arms are raised sideways to the yard standing position, the hands are then quickly turned upward and the movement continued upward.

(*b*) *Standing position, command.*—(1) 1. *Arms forward and downward,* 2. *SINK.* Arms are slowly lowered in the reverse manner to the sides.

(2) 1. *Arms sideways and downwards,* 2. *SINK.* Arms are slowly lowered in the reverse manner to the sides.

(*c*) *Common faults.*—(1) Arms not held straight and not in line with the trunk.

(2) Palms not held shoulder width apart.

Rest standing position.—(*a*) *Command.*—1. *Neck,* 2. *REST.* Arms are bent quickly at the elbows, carried up the shortest way, and hands are placed in back of the neck; palms to the front; thumbs and fingers extended and joined; finger tips touching each other; elbows well back, chest high; head erect.

(*b*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.* Arms are stretched down to the sides with force the shortest way.

(*c*) *Common faults.*—(1) The head carried forward during the arm movement.

(2) The elbows not carried back far enough.

(3) Fingers interlocking.

Palm standing position.—(*a*) *Command.*—1. *Hands outward,* 2. *TURN.* With the arms fully stretched and held close to the body, the palms are turned forward and outward away from the body as far as possible.

(*b*) *Standing position, command.*—1. *Hands inward,* 2. *TURN.* Hands are turned inward toward the body.

(*c*) *Common faults.*—(1) Arms not held close to the body.

(2) Shoulders carried forward.

STARTING POSITIONS OF THE LEGS

Close standing position.—(*a*) *Command.*—1. *Feet,* 2. *CLOSE.* By slightly raising the toes from the deck and pivoting on the heels, the feet are carried inward so the inner sides of the feet touch.

(*b*) *Standing position, command.*—1. *Feet,* 2. *OPEN.* By pivoting on the heels, the feet are turned out to the standing position.

(*c*) *Common faults.*—(1) Bending the body forward at the waist line.

(2) Feet dragging while closing and opening.

Outward walk standing position.—(*a*) *Command.*—1. *Left (right) foot outward,* 2. *PLACE.* The designated foot is placed two foot-lengths outward (45 degrees to the front); weight of the body equally distributed on both feet; shoulders square to the front.

(*b*) *Standing position, command.*—1. *Feet together,* 2. *PLACE.* By pushing from the deck with the outward foot, it is carried back to the standing position.

(*c*) *Common faults.*—(1) Shoulders not square to the front.

(2) Feet sliding along the deck.

(3) Angle between the feet not maintained.

(4) Weight not equally distributed.

Forward walk standing position.—(*a*) *Command.*—1. *Left (right) foot forward,* 2. *PLACE.* The designated foot is placed two foot-lengths directly forward; weight of the body equally distributed on both feet; shoulders square to the front.

(*b*) *Standing position, command.*—1. *Feet together,* 2. *PLACE.* By pushing from the deck with the forward foot, it is carried back to the standing position.

(*c*) *Common faults,* in addition to those for Outward Walk Standing Position, designated foot not placed directly forward.

Outward lunge standing position.—(*a*) *Command.*—1. *Left (right) foot outward,* 2. *LUNGE.* The designated foot is placed three foot-lengths outward (45 degrees to the front); outward knee directly over the foot and bent to a right angle; both feet flat on deck; rear leg, trunk, and head in a straight line 45 degrees to the front.

(*b*) *Standing position, command.*—1. *Feet together,* 2. *PLACE.* By pushing from the deck with the outward foot, it is carried back to the standing position.

(*c*) *Common faults.*—(1) Not stepping out three foot lengths.

(2) Feet not flat on the deck.

(3) Rear leg, body, and head not in a straight line.

Forward lunge standing position.—(*a*) *Command.*—1. *Left (right) foot forward,* 2. *LUNGE.* The designated foot is placed three foot-lengths forward; forward knee is directly over foot and bent to a right angle; both feet flat on the deck; rear leg, trunk, and head in a straight line to the front; shoulders square to the front.

(*b*) *Standing position, command.*—1. *Feet together,* 2. *PLACE.* By pushing off from the deck with the forward foot, it is carried back to the standing position.

(*c*) *Common faults,* in addition to those for Outward Lunge Standing Position, (1) designated foot not placed directly forward and (2) heel of the rear foot raised from the deck.

Stride standing position. (Three methods.)—(*a*) *Command.*—(1) 1. *Left (right) foot sideways,* 2. *PLACE.* The designated foot is carried directly sideways two foot-lengths; weight of the body equally distributed on both feet.

(2) 1. *Feet sideways.* 2. *PLACE.* (Two motions.) The left foot is carried one foot-length to the left; the right foot is then carried one foot-length to the right.

(3) 1. *Feet sideways with a jump,* 2. *Place.* By pushing off from the deck and springing upward, the legs are parted sideways; the feet are planted on the deck two foot-lengths apart.

(*b*) *Standing position, command.*—(1) 1. *Feet together,* 2. *PLACE.* The foot which was placed sideways is carried back to the standing position.

(2) 1. *Feet together,* 2. *PLACE.* (Two motions). The left foot is carried in one foot-length; right foot is then carried to the standing position.

(3) 1. *Feet together with a jump,* 2. *PLACE.* By pushing off from the deck and springing upward, both feet are carried to the standing position.

(*c*) *Common faults.*—(1) Not making the stride long enough.

(2) Body swaying.

(3) Sliding feet on the deck.

Toe standing position.—(*a*) *Command.*—1. *Heels,* 2. *RAISE,* With the heels together and the arms held to the sides, the body is raised as high as possible on the toes, maintaining the balance; chest held high; head erect.

(*b*) *Standing position, command.*—1. *Heels,* 2. *SINK.* The heels are lowered to the deck.

(c) *Common faults.*—(1) Body swaying.

(2) Heels not held together.

Spring standing position.—(*a*) *Command.*—1. *Heels,* 2. *RAISE,* 3. *Knees.* 4. *BEND.* Maintaining balance, knees are bent downward until upper legs and lower legs are at right angles to each other; the position of the rest of the body is unaltered.

(*b*) *Standing position, command.*—1. *Knees,* 2. *STRETCH* (Keep-

ing the heels clear of the deck, the knees are stretched upward.), 3. *Heels,* 4. *SINK.*

(*c*) *Common faults.*—(1) Heels lowered during knee bending and stretching.

(2) Body swaying.

Spring sitting position.—(*a*) *Command.*—1. *Heel's,* 2. *RAISE,* 3. *Knees to sitting,* 4. *BEND.* Maintaining balance, knees are bent downward until the buttocks touch the heels; the position of the rest of the body is unaltered.

(*b*) *Standing position, command.*—1. *Knees,* 2. *Stretch,* 3. *Heels,* 4. *SINK.*

(*c*) *Common faults,* in addition to those for Spring Standing Position, knees not bent enough.

STARTING POSITIONS OF THE TRUNK

Stoop standing position.—(*a*) *Command.*—1. *Trunk forward,* 2. *BEND.* With the knees straight and arms at the sides, the trunk is slowly lowered forward to the horizontal so that the trunk and legs form a right angle.

(*b*) *Standing position, command.*—1. *Trunk upward,* 2. *STRETCH.* Trunk is raised slowly upward to the standing position.

(*c*) *Common faults.*—(1) Back rounded.

(2) Knees not held straight.

(3) Head allowed to fall forward.

(4) Chin not drawn in.

Arch standing position.—(*a*) *Command.*—1. *Trunk backward,* 2. *BEND.* With knees straight and arms at the sides, the trunk is bent slowly backward; bending takes place in the upper spine; chest held high; chin drawn in.

(*b*) *Standing position, command.*—1. *Trunk upward,* 2. *STRETCH.* Trunk is raised slowly upward to the standing position.

(*c*) *Common faults.*—(1) Bending the lower spine.

(2) Chin not drawn in and head allowed to fall backward.

Twist standing position.—(*a*) *Command.*—1. *Trunk to the left (right),* 2. *TWIST.* With arms at the sides, the trunk is slowly twisted above the hips, not in the thighs, to the designated side as far as possible; hips square to the front.

(*b*) *Standing position, command.*—1. *Trunk forward,* 2. *TWIST.* Trunk is slowly twisted forward to the standing position.

(*c*) *Common faults.*—(1) Twisting the thighs or neck instead of the trunk.

(2) Hips not square to the front.

Side bend standing position.—(*a*) *Command.*—1. *Trunk to the left (right),* 2 *BEND.* With arms held at the sides, chin drawn in, and feet firm on the deck, the trunk is slowly bent to the designated side as far as possible. The position of the head is unaltered in relation to the trunk.

(*b*) *Standing position, command.*—1. *Trunk upward,* 2. *STRETCH.* The trunk is slowly raised upward to the standing position.

(*c*) *Common faults.*—(1) Raising foot off the deck.

(2) Head not in line with the spine.

(3) Twisting the trunk.

MISCELLANEOUS STARTING POSITIONS

Crouch sitting position.—(*a*) *Command.*—1. *Crouch sitting,* 2. *PLACE.* The knees are bent to sitting as previously described, and the hands are placed on the deck between the knees, keeping them shoulder width apart; head held high; back straight.

(*b*) *Standing position, command.*—*ATTENTION.* By pushing from the deck with the hands and stretching the knees, the body is straightened up to the standing position.

(*c*) *Common faults.*—(1) Back rounded.

(2) Head carried forward.

Stoop falling position.—(*a*) *Command.*—1. *Stoop falling,* 2. *PLACE.* (Two motions.) (1) Execute crouch sitting as described above.

(2) The weight is taken on the arms and, without sliding the feet along the deck, the legs are stretched backward with force, toes placed on the deck so that the body is in an inclined position; arms straight; legs, trunk, and head in a straight line.

(*b*) *Standing position, command.*—*ATTENTION.* (Two motions.) (1) By pushing from the deck with toes, the legs are brought forward to crouch sitting position.

(2) Come to *Attention* as in crouch sitting position.

(*c*) *Common faults.*—(1) Legs and trunk not in a straight line, allowing back to sway or hips to raise.

(2) Sliding feet along the deck.

Back stoop falling position.—(*a*) *Command.*—1. *Stoop falling,* 2. *PLACE,* 3. *Back stoop falling on left (right) arm,* 4. *TURN.* By keeping the designated arm and both legs straight, the body is turned on the designated arm and foot; the free hand placed on the deck about 18 inches from the other hand; back toward the deck; heels on the

deck; body in an inclined position; legs, trunk, and head in a straight line.

(*b*) *Standing position, command.*—1. *Stoop falling on the left (right) arm,* 2. *TURN* (The body is turned on the designated arm and foot back to the stoop falling position.), 3. *ATTENTION* (See Stoop Falling).

(*c*) *Common faults,* in addition to those for Crouch Sitting and Stoop Falling, (1) arms not held straight and (2) head carried forward and not in line with trunk, (3) body allowed to hinge at waist line.

Side falling position.—(*a*) *Command.*—1. *Stoop falling,* 2. *PLACE,* 3. *Side falling on left (right) arm,* 4. *TURN.* The body is turned on the designated arm and foot until the designated side of the body is turned toward the deck; free arm at the side; supporting arm straight; body in an inclined position; legs, trunk, and head in a straight line.

(*b*) *Standing position, command.*—1. *Stoop falling on the left (right) arm,* 2. *TURN* (The body is turned on the designated arm and foot back to the stoop falling position.), 3. *ATTENTION* (See Stoop Falling).

(*c*) *Common faults.*—(1) Body and arms not held straight.

(2) Chin not drawn in and head held to the side.

(3) Legs not together.

Lying position.—(*a*) *Command.*—1. *Stoop falling,* 2. *PLACE.* 3. *Lying on the left (right) arm,* 4. *TURN.* The body is turned on the designated arm and foot to the back stoop falling position, then immediately lowered to the deck so that the back of the body is flat on the deck; arms at the sides; legs together.

(*b*) *Standing position, command.*—1. *Stoop falling on the left (right) arm,* 2. *TURN* (The body is turned on the designated arm and foot to the stoop falling position.), 3. *ATTENTION* (See Stoop Falling).

(*c*) *Common faults.*—(1) Legs apart.

(2) Arms not at the sides.

Forward lying position.—(*a*) *Command.*—1. *Stoop falling,* 2. *PLACE,* 3. *Forward lying,* 4. *PLACE.* The body is quickly lowered to the deck and arms placed at the sides; chin drawn in; legs together.

(*b*) *Standing position, command.*—1. *Stoop falling,* 2. *PLACE* (The hands are placed on the deck as in stoop falling and the arms are straightened, raising the body to the stoop falling position.), 3. *ATTENTION* (See Stoop Falling).

(c) *Common faults.*—(1) Front of body not flat on the deck.
(2) Arms not at the sides.
(3) Legs apart.
(4) Chin not drawn in.

Stride kneeling position.—(*a*) *Command.*—1. *Stride kneeling,* 2. *PLACE.* (Two motions.) (1) The right knee is bent and the left knee placed on the deck about 6 inches to the left of the right foot, half kneeling.

(2) The right knee is placed on the deck so that the distance between the knees is about 12 inches; body, from the knees up, held straight; heels together.

(*b*) *Standing position, command.*—*ATTENTION.* (Two motions.)

(1) The left knee is raised and the foot placed on the deck opposite the right knee; both hands are placed on the left knee.

(2) By stretching the knees, the body is raised to the standing position and the arms lowered to the sides.

(*c*) *Common faults.*—(1) Hinging the body at the waistline.
(2) Touching the deck with the hands in taking the position.
(3) Heels not together when in the kneeling position.

COMBINED STARTING POSITIONS OF THE ARMS AND LEGS

Wing stride standing position.—(*a*) *Command.* 1. *Left (right) foot sideways and hips,* 2. *FIRM.* Execute the movement simultaneously.

(*b*) *Standing position, command.*—1. *Feet together and arms downward,* 2. *STRETCH.* Execute the movements simultaneously.

Bend toe standing position.—(*a*) *Command.*—1. *Heels raising and arms,* 2. *BEND.* Execute the movements simultaneously.

(*b*) *Standing position, command.*—1. *Heels sinking and arms downward,* 2. *STRETCH.* Execute the movements simultaneously.

Rest outward walk standing position.—(*a*) *Command.*—1. *Left (right) foot outward place and neck,* 2. *REST.* Execute the movements simultaneously.

(*b*) *Standing position, command.*—1. *Feet together and arms downward,* 2. *STRETCH.* Execute the movements simultaneously.

Stretch outward lunge standing position.—(*a*) *Command.*—1. *Left (right) foot outward lunging and arms forward and upward,* 2. *RAISE* Execute the movements simultaneously.

(*b*) *Standing position, command.*—1. *Feet together and arms forward and downward,* 2. *SINK.* Execute the movements simultaneously

(*c*) The stretch position can also be taken on appropriate commands by raising the arm sideways and upward.

EXERCISES OF THE LEGS FROM THE STARTING POSITIONS

Wing standing; heel raising.—(*a*) *Starting position, command.*—1. *Hips,* 2. *FIRM.*

(*b*) *Exercise, command.*—1. *Heels,* 2. *RAISE,* 3. *Heels,* 4. *SINK,* 5. *By the numbers,* 6. *ONE,* 7. *TWO,* and so on.

(*c*) *Standing position, command.*—*1. Arms downward, 2. STRETCH.*

Yard, stride standing; heel raising.—(*a*) *Starting position, command.*—1. *Left (right) foot sideways and arms sideways,* 2. *RAISE.*

(*b*) *Exercise, command.*—1. *Heels,* 2. *RAISE,* 3. *Heels,* 4. *SINK,* 5. *By the numbers,* 6. *ONE,* 7. *TWO,* and so on.

(*c*) *Standing position, command.*—1. *Feet together and arms downward,* 2. *SINK.*

Wing, outward walk standing; heel raising.—(*a*) *Starting position, command.*—1. *Left (right) foot outward, hips,* 2. *FIRM.*

(*b*) *Exercise, command.*—1. *Heels,* 2. *RAISE,* 3. *Heels,* 4. *SINK,* 5. *By the numbers,* 6. *ONE,* 7. *TWO,* and so on.

(*c*) *Standing position, command.*—1. *Feet together and arms downward,* 2. *STRETCH.*

Yard, forward walk standing; heel raising.—(*a*) *Starting position, command.*—1. *Left (right) foot forward and arms sideways,* 2. *RAISE.*

(*b*) *Exercise, command.*—1. *Heels,* 2. *RAISE,* 3. *Heels,* 4. *SINK,* 5. *By the numbers,* 6. *ONE,* 7. *TWO,* and so on.

(*c*) *Standing position, command.*—1. *Feet together and arms downward,* 2. *SINK.*

Wing standing; heel raising and knee bending.—(*a*) *Starting position, command.*—1. *Hips,* 2. *FIRM.*

(*b*) *Exercise, command.*—1. *Heels,* 2. *RAISE,* 3. *Knees,* 4. *BEND,* 5. *Knees,* 6. *STRETCH,* 7. *Heels,* 8. *SINK,* 9. *By the numbers,* 10. *ONE,* 11. *TWO,* 12. *THREE,* 13. *FOUR,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.*

Yard standing; heel raising and knee bending to sitting.—(*a*) *Starting position, command.*—1. *Arms sideways,* 2. *RAISE.*

(*b*) *Exercise, command.*—1. *Heels,* 2. *RAISE,* 3. *Knees to sitting,* 4. *BEND,* 5. *Knees,* 6. *STRETCH,* 7. *Heels,* 8. *SINK,* 9. *By the numbers,* 10. *ONE,* 11. *TWO.* 12. *THREE,* 13. *FOUR.* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *SINK.*

Wing standing; lunging outward.—(*a*) *Starting position, command.*—1. *Hips,* 2. *FIRM.*

(*b*) *Exercise, command.*—1. *Left foot outward,* 2. *LUNGE,* 3. *Feet together,* 4. *PLACE,* 5. *Right foot outward,* 6. *LUNGE,* 7. *Feet together,* 8. *PLACE,* 9. *By the numbers,* 10. *ONE,* 11. *TWO,* 12. *THREE,* 13. *FOUR,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.*

Bend standing; lunging forward.—(*a*) *Starting position, command.*—1. *Arms,* 2. *BEND.*

(*b*) *Exercise, command.*—1. *Left foot forward,* 2. *LUNGE,* 3. *Feet together,* 4. *PLACE,* 5. *Right foot forward,* 6. *LUNGE,* 7. *Feet together,* 8. *PLACE,* 9. *By the numbers,* 10. *ONE,* 11. *TWO,* 12. *THREE,* 13. *FOUR,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.*

Wing standing; advance, by lunging forward.—(*a*) *Starting position, command.*—1. *Hips,* 2. *FIRM.*

(*b*) *Exercise, command.*—1. *Advancing forward by the numbers.* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR,* and so on. At the command *ONE,* the left foot is placed forward as in Forward Lunge Standing Position; at *TWO* the right foot is placed alongside the left; at *THREE* the right foot is placed forward; at *FOUR* the left foot is placed alongside the right, and so on. Then the class is faced about, the exercise repeated, and the class is faced about again.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.*

(*d*) *Additional common faults.*—The class not working in unison and not keeping the proper dress in ranks while advancing.

EXERCISES OF THE ARMS FROM THE STARTING POSITIONS

Standing; arm stretching sideways—(*a*) *Exercise, command.*—1. *Arms sideways,* 2. *STRETCH.* (Two motions.) (1) The arms are bent upward to the bend position.

(2) The arms are stretched sideways to the horizontal with force; palms turned down. 3. *Arms downward,* 4. *STRETCH.* (Two motions.)

(1) The arms are carried to the bend position with a snap.

(2) The arms are stretched downward with force to the sides. 5. *By the numbers,* 6. *ONE,* 7. *TWO,* 8. *THREE,* 9. *FOUR,* and so on.

Note.—The pause at the bend position is very short.

(*b*) *Common faults.*—(1) Arms not fully stretched and palms not turned down.

(2) Not enough snap and effort in the bending movement.

Standing; arm stretching upward.—(*a*) *Exercise, command.*— 1. *Arms upward,* 2. *STRETCH.* (Two motions.) (1) The arms are bent upward as in Bend Standing Position.

(2) The arms are stretched upward with force to the vertical position; palms turned inward, shoulder width apart. 3. *Arms downward,* 4. *STRETCH.* (Two motions.) (1) The arms are carried to the bend position with a snap.

(2) The arms are stretched downward with force to the sides. 5. *By the numbers,* 6. *ONE,* 7. *TWO,* 8. *THREE,* 9. *FOUR,* and so on.

NOTE.—The pause at the bend position is very short.

(*b*) *Common faults.*—(1) Arms not stretched upward with force.

(2) Palms not turned inward and shoulder width apart.

Standing; arm stretching forward.—*Exercise, command.*—1. *Arms forward,* 2. *STRETCH.* (Two motions.) (1) The arms are bent upward as in Bend Standing Position.

(2) The arms are stretched forward to the horizontal position, with force; palms turned inward, shoulder width apart. 3. *Arms downward,* 4. *STRETCH.* (Two motions.) (1) The arms are carried to the bend position with a snap.

(2) The arms are stretched downward with force to the sides. 5. *By the numbers,* 6. *ONE,* 7. *TWO,* 8. *THREE,* 9. *FOUR,* and so on.

Note.—The pause at the bend position is very short

Standing; arm stretching backward.—(*a*) *Exercise, command.*— 1. *Arms backward,* 2. *STRETCH.* (Two motions.) (1) The arms are bent upward as in Bend Standing Position.

(2) The arms are stretched downward and backward with force; palms turned inward, shoulder width apart. 3. *Arms downward,* 4. *STRETCH.* (Two motions.) (1) The arms are carried to the bend position with a snap.

(2) The arms are stretched downward with force to the sides. 5. *By the numbers,* 6. *ONE,* 7. *TWO,* 8. *THREE,* 9. *FOUR,* and so on.

Note.—The pause at the bend position is very short.

(*b*) *Common faults.*—(1) Head carried forward as arms are stretched backward.

(2) Arms not carried back far enough.

Forward bend standing; arm striking sideways.—(*a*) *Starting position, command.*—1. *Arms forward,* 2. *BEND.*

(*b*) *Exercise, command.*—1. *Arms sideways,* 2. *STRIKE* (The arms

are stretched sideways with force to the yard position; upper arms in a firm position.), 3. *Arms forward,* 4. *BEND* (The arms are carried with force to the first position.), 5. *By the numbers,* 6. *ONE,* 7. *TWO,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.*

Bend standing; arm stretching in various directions.—(*a*) *Starting position, command.*—1. *Arms,* 2. *BEND.*

(*b*) *Exercise, command.*—1. *Arms sideways,* 2. *STRETCH,* 3. *Arms,* 4. *BEND,* 5. *Arms upward.* 6. *STRETCH,* 7. *Arms,* 8. *BEND,* 9. *Arms forward,* 10. *STRETCH,* 11. *Arms,* 12. *BEND,* 13. *Arms backward,* 14. *STRETCH,* 15. *Arms,* 16. *BEND,* 17. *By the numbers,* 18. *ONE,* 19. *TWO,* 20. *THREE,* 21. *FOUR,* 22. *FIVE,* 23. *SIX,* 24. *SEVEN,* 25. *EIGHT,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.*

Reach standing; arm swinging upward and forward.—(*a*) *Starting position, command.*—1. *Arms forward,* 2. *RAISE.*

(b) *Exercise, command.*—1. *Arms upward,* 2. *SWING* (The arms are swung upward to the reach position.), 3. *Arms forward,* 4. *SWING* (The arms are swung forward to the reach position.), 5. *By the numbers,* 6. *ONE,* 7. *TWO,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *SINK.*

Stretch standing; arm swinging forward and upward.—(*a*) *Starting position, command.*—1. *Arms forward and upward,* 2. *RAISE.*

(*b*) *Exercise, command.*—1. *Arms forward,* 2. *SWING* (The arms are swung upward to the reach position.), 3. *Arms forward,* 4. *SWING* (The arms are swung forward to the reach position.), 5. *By the numbers,* 6. *ONE,* 7. *TWO,* and so on.

(*c*) *Standing position, command.*—1. *Arms forward and downward* 2. *SINK.*

Reach standing; arm swinging sideways.—(*a*) *Starting position, command.*—1. *Arms, forward,* 2. *RAISE.*

(*b*) *Exercise, command.*—1. *Arms sideways,* 2. *SWING* (The arms are swung sideways to the yard position, palms turned downward.), 3. *Arms forward,* 4. *SWING* (The arms are swung forward to the reach position, palms turned inward.), 5. *By the numbers,* 6. *ONE,* 7. *TWO,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *SINK.*

(*d*) *Common fault.*—The head carried forward during the arm swinging sideways.

Yard standing; arm swinging forward.—(*a*) *Starting position, command.*—1. *Arms sideways,* 2. *RAISE.*

(*b*) *Exercise, command.*—1. *Arms forward.* 2. *Swing* (The arms are swung forward to the reach position, palms turned inward.), 3. *Arms sideways,* 4. *SWING* (The arms are swung sideways to the yard position.), 5. *By the numbers,* 6. *ONE,* 7. *TWO,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *SINK.*

(*d*) *Common fault.*—The head carried forward during the arms swinging sideways.

Standing; arm swinging forward and upward.—(*a*) *Exercise, command.*—1. *Arms forward and upward,* 2. *SWING* (The arms are swung forward and upward to the stretch position), 3. *Arms forward and downward,* 4. *SWING* (The arms are swung forward and downward to the standing position.), 5. *By the numbers,* 6. *ONE,* 7. *TWO,* and so on.

(*b*) *Common faults.*—(1) The arms not held straight and not shoulder width apart.

(2) The arms allowed to swing beyond the thighs in the downward swing.

Standing; arm swinging sideways and upward.—(*a*) *Exercise, command.*—1. *Arms sideways and upward,* 2. *SWING* (The arms are swung sideways and upward to the stretch position, turning the palms up while passing the yard position.), 3. *Arms sideways and downward,* 4. *SWING* (The arms are swung sideways and downward to the standing position, turning the palms down while passing the yard position.), 5. *By the numbers,* 6. *ONE,* 7. *TWO,* and so on.

(*b*) *Common faults.*—In addition to those in preceding exercise, the arms allowed to slap the thighs in the downward swing.

Standing; arm circling with a swing.—(*a*) *Exercise, command.*—1. *Arms forward and upward,* 2. *SWING* (The arms are swung forward and upward to the stretch position.), 3. *Arms sideways and downward,* 4. *SWING* (The arms are swung sideways and downward to the standing position, turning the palms down while passing the yard position.), 5. *By the numbers,* 6. *ONE,* 7. *TWO,* and so on.

Half stretch standing; arm changing with a swing.—(*a*) *Starting position, command.*—1. *Left (right) arm forward and upward,* 2. *RAISE.*

(*b*) *Exercise, command.*—1. *Arms changing with a swing by the number,* 2. *ONE* (The arm above the head is swung forward and downward at the same time the other arm is swung forward and upward.), 3. *TWO* (The arms are changed in the reverse manner.), and so on.

(*c*) *Standing position, command.*—1. *Left (right) arm forward and downward.* 2. *SINK.*

(*d*) *Common faults.*—(1) The arms not held straight during the swinging.

(2) The head carried forward and the shoulders not held firm.

Stretch standing; arm parting.—(*a*) *Starting position, command.*—1. *Arms forward and upward,* 2. *RAISE.*

(*b*) *Exercise, command.*—1. *Arms parting by the numbers,* 2. *ONE* (The arms are quickly parted and lowered to the yard (A) position. The yard (A) position is the same as the yard position previously described, except that the palms are turned upward.), 3. *TWO* (The arms are swung upward to the stretch position.), and so on.

(*c*) *Standing position, command.*—1. *Arms forward and downward,* 2. *SINK.*

Yard (A) standing; arm parting.—(*a*) Starting position, *command.*—1. *Arms sideways,* 2. *RAISE,* 3. *Hands upward,* 4. *TURN* (The palms are turned upward.).

(*b*) *Exercise, command.*—1. *Arms parting by the numbers,* 2. *ONE* (The arms are swung upward to the stretch position.), 3. *TWO* (The arms are parted and lowered to the yard (A) position.), and so on.

(*c*) *Standing position, command.*—1. *Hands downward,* 2. *TURN* (The palms are turned downward.), 3. *Arms downward,* 4. *SINK.*

EXERCISES OF THE NECK FROM THE STARTING POSITIONS

Wing standing; head bending backward (forward).—(*a*) *Starting position, command.*—1. *Hips,* 2. *FIRM.*

(*b*) *Exercise, command.*—1. *Head backward,* 2. *BEND* (The head is bent backward as far as possible, chin drawn in, shoulders held firm.), 3. *Head upward,* 4. *STRETCH* (The head is raised to the standing position.), 5. *Head forward,* 6. *BEND,* 7. *Head upward,* 8. *STRETCH,* 9. *By the numbers,* 10. *ONE,* 11. *TWO,* 12. *THREE,* 13. *FOUR,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.*

NOTE.—Head bending can also be carried out from the bend, yard, or forward bend standing positions.

Wing standing; head bending sideways.—(*a*) *Starting position, command.*—1. *Hips,* 2. *FIRM.*

(*b*) *Exercise, command.*—1. *Head to the left,* 2. *BEND* (The head is slowly bent to the left as far as possible, chin drawn in, shoulders held firm.), 3. *Head upward,* 4. *STRETCH* (The head is slowly raised to the standing position.), 5. *Head to the right,* 6. *BEND,* 7. *Head*

upward, 8. *STRETCH,* 9. *By the numbers,* 10. *ONE,* 11. *TWO,* 12. *THREE,* 13. *FOUR,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.*

Note.—Head bending sideways can also be carried out from the bend, yard, or forward bend standing positions.

Wing standing; head twisting.—(*a*) *Starting position, command.*—1. *Hips,* 2. *FIRM.*

(*b*) *Exercise, command.*—1. *Head to the left,* 2. *TWIST* (The head is slowly twisted to the left as far as possible, keeping the head erect and the chin drawn in.), 3. *Head forward,* 4. *TWIST* (The head is slowly twisted forward to the standing position.), 5. *Head to the right,* 6. *TWIST,* 7. *Head forward,* 8. *TWIST,* 9. *By the numbers,* 10. *ONE,* 11. *TWO,* 12. *THREE,* 13. *FOUR,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.*

Note.—Head twisting can also be carried out from the bend, yard, and spring sitting position.

EXERCISES OF THE TRUNK FROM THE STARTING POSITIONS

Rest standing; trunk bending backward (forward).—(*a*) *Starting position command.*—1. *Neck,* 2. *REST.*

(*b*) *Exercise, command.*—1. *Trunk backward,* 2. *BEND,* 3. *Trunk upward,* 4. *STRETCH,* 5. *Trunk forward,* 6. *BEND,* 7. *Trunk upward,* 8. *STRETCH,* 9. *By the numbers,* 10. *ONE,* 11. *TWO,* 12. *THREE,* 13. *FOUR,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.*

Note.—Trunk bending backward and forward can also be carried out from the wing, bend, yard, or stretch standing positions.

Yard standing; trunk bending sideways.—(*a*) *Starting position, command.*—1. *Arms sideways,* 2. *RAISE.*

(*b*) *Exercise, command.*—1. *Trunk to the left.* 2. *BEND,* 3. *Trunk upward,* 4. *STRETCH,* 5. *Trunk to the right,* 6. *BEND,* 7. *Trunk upward,* 8. *STRETCH,* 9. *By the numbers,* 10. *ONE,* 11. *TWO,* 12. *THREE,* 13. *FOUR,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *SINK.*

Note.—Trunk bending sideways can also be carried out from the wing, rest, bend, stretch, or forward bend standing positions.

Rest standing; trunk twisting.—(*a*) *Starting position, command.*—1. *Neck,* 2. *REST.*

(*b*) *Exercise, command.*—1. *Trunk to the left,* 2. *TWIST,* 3. *Trunk forward,* 4. *TWIST,* 5. *Trunk to the right,* 6. *TWIST,* 7. *Trunk forward,* 8. *TWIST,* 9. *By the numbers,* 10. *ONE,* 11. *TWO,* 12. *THREE,* 13. *FOUR,* and so on.

(*c*) *Standing position, command.*—1. *Arms downward,* 2. *STRETCH.*

Note.—Trunk twisting can also be carried out from the bend, yard, wing, forward bend, or stretch standing positions.

CHAPTER 54

PHYSICAL DRILLS WITH ARMS

General rules.—(*a*) All movements in this section are in four counts and except *Come to ready* are usually performed four times.

(*b*) The exercises may be executed by command, or to music, or silently, following the motions of a leader, and may be discontinued by the command *HALT,* when the *READY* will be resumed.

Come to ready (see Figs. 54-1, 54-2, and 54-3).—*Command.*—1. *Come to ready,* 2. *ONE,* 3. *TWO,* 4. *THREE.*

FIG. 54-1—Come to ready. End of first count.

FIG. 54-2—Come to ready. End of second count.

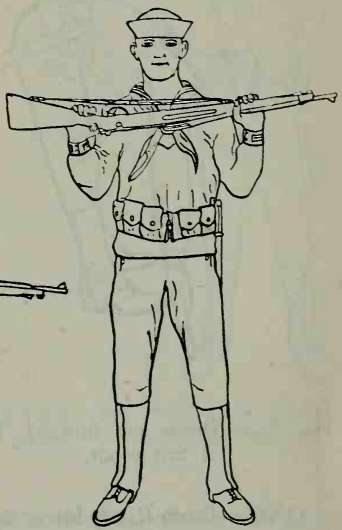


FIG. 54-3—Come to ready. End of third count.

ONE.—Raise the piece with the right hand, grasp it with the left at the height of the right shoulder, knuckles toward the body. The right hand will grasp the small of the stock, forefinger under the guard.

TWO.—Let the piece drop in front of the body to a horizontal position, sling down, keeping the body erect.

THREE.—Raise the piece horizontally to the height of the shoulders, sling up, at the same time moving the left foot to the left about 12 inches. Keep the chest out and the shoulders well back. This position is *Ready,* and is the starting point of all the movements under arms.

Down and forward (see Figs. 54-4 and 54-5).—To exercise the muscles of the hips, back, and arms. *Command.*—1. *Down and forward,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR,* and so on.

FIG. 54-4—Down and forward. End of first count.

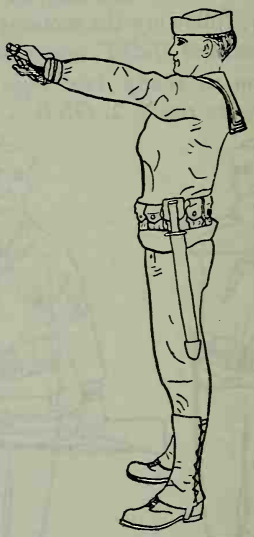


FIG. 54-5—Down and forward. End of third count.

ONE.—From *Ready* lower the piece horizontally to the insteps, keeping the arms and knees straight, if possible.

TWO.—Back to *Ready,* chest out, elbows back.

THREE.—Push piece horizontally forward.

FOUR.—Back to *Ready.*

Forward and up (see Fig. 54-6).—To exercise the muscles of the arms and of side walls of the chest. *Command.*—1. *Forward and up,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR,* and so on.

ONE.—From *Ready,* push out horizontally forward as in last exercise

TWO.—Back to *Ready,* chest out, elbows back.

THREE.—Push the piece to high vertical, keeping it horizontal, and expanding chest.

FOUR.—Back to *Ready.*

Up and shoulders (see Fig. 54-7).—To exercise the muscles of the arms and of the side and front walls of the chest. *Command.*—1. *Up and shoulders,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR,* and so on.

ONE.—From *Ready,* push the piece to vertical, as in last exercise.

FIG. 54-6—Forward and up. End of third count.

FIG. 54-7—Up and shoulders. End of second count.

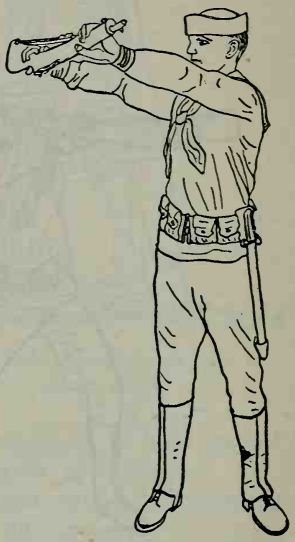


FIG. 54-8—Side pushes. End of first count.

TWO.—Lower piece to back of shoulders, head up, elbows well back.

THREE.—Up again to vertical.

FOUR.—Down to *Ready.*

Side pushes (see Fig. 54-8).—To exercise the rotary muscles of the body and thighs and the loin muscles. *Command.*—1. *Side pushes,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR,* and so on.

ONE.—From *Ready,* push the piece horizontally to right side, twisting the body, keeping the eyes on the piece but keeping the heels firmly on the ground.

TWO.—Back to *Ready,* chest out, elbows back.

THREE.—Push the piece to the left side, as above.

FOUR.—Back to *Ready.*

Diagonal lunges (see Fig. 54-9).—To exercise the muscles of the arms, back, and legs. *Command.*—1. *Diagonal lunges,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR,* and so on.

ONE.—From *Ready,* lunge about 36 inches diagonally to the right, with the right foot, at the same time pushing the piece out horizontally. The left foot should be flat and the eyes directed to the piece.

FIG. 54-9—Diagonal lunges. End of first count.

FIG. 54-10—Forward lunges. End of first count.

TWO.—Back to *Ready,* chest out, elbows back.

THREE.—Lunge to the left with left foot, as above.

FOUR.—Back to *Ready.*

Forward lunges (see Fig. 54-10).—To exercise the muscles of the arms and legs and the side walls of the chest. *Command.*—1. *Forward lunges,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR,* and so on.

ONE.—From *Ready,* lunge about 36 inches directly to the front, with the right foot, at the same time pushing the piece horizontally to vertical and directing the eyes to the piece. Keep left foot flat.

TWO.—Back to *Ready.*

THREE.—Lunge to the front with left foot, as above.

FOUR.—Back to *Ready.*

Front sweeps (see Figs. 54-11 and 54-12).—To exercise all the principal posterior muscles of the body. *Command.*—1. *Front sweeps, slow,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR,* and so on.

FIG. 54-11—Front sweeps.

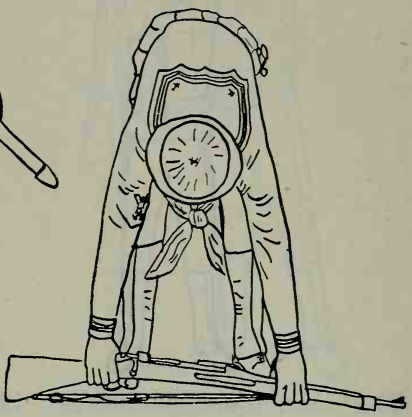


FIG. 54-12—Front sweeps. End of second count.

ONE.—From *Ready,* raise the piece horizontally to high vertical, keeping the chest well out and emphasizing the up-stretch.

TWO.—Lower the piece slowly in a front semicircle to insteps, keeping the arms straight and emphasizing the out-reach.

THREE.—Raise the piece slowly in a front semicircle to vertical.

FOUR.—Down to *Ready.*

Overhead twists (see Figs. 54-13 and 54-14).—To exercise the rotary muscles of the upper part of the body; also to stimulate the venous circulation. *Command.*—1. *Overhead twists, butt front,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR,* 6. *Muzzle front,* 7. *ONE,* 8. *TWO.* 9. *THREE,* 10. *FOUR,* and so on.

ONE.—From *Ready,* raise the piece overhead, at the same time twisting it till the butt points directly forward. Keep the piece horizontal.

TWO.—Twist the piece to the right until the muzzle points directly forward. Hold the hips firmly forward, confining the movement to the upper part of the body.

FIG. 54-13—Overhead twist. Butt front.

FIG. 54-14—Overhead twist. Muzzle front.

THREE. Twist back till the butt points directly forward.

FOUR.—Lower the piece to *Ready.*

ONE.—From *Ready* raise the piece overhead, at the same time twisting it till the muzzle points directly forward.

TWO.—Twist the piece to the left until the butt points directly forward.

THREE.—Twist back until the muzzle points forward.

FOUR.—Lower the piece to *Ready.*

Side twists (see Figs. 54-15 and 54-16).—To exercise the muscles of the sides, loins, and small of the back.—(*a*) *Command.*—1. *Side twists,* 2. *ONE,* 3. *TWO,* 4. *THREE,* 5. *FOUR,* and so on.

ONE.—From *Ready,* drop the piece horizontally in front to position No. 2 in coming to *Ready.*

TWO.—Lifting the butt up, carry the piece strongly to the left side and out, muzzle pointing directly down. Keep the hips firm.

THREE.—Return the piece to position No. 2 in coming to *Ready.*

FOUR.—Lifting the muzzle, carry the piece strongly to the right side and out, muzzle pointing directly up.

(*b*) Repeat the exercise.

(*c*) At the end of this exercise, come to *Order arms.*

FIG. 54-15—Side twist. End of second count.

FIG. 54-16—Side twist. End of fourth count.

PART SIX

LANDING FORCE

CHAPTER 55

EQUIPMENT CARRIED BY EACH MAN: HAVERSACK, PACK, RATIONS; ASSEMBLING THE EQUIPMENT

Landing force 691
Light marching order 691
Heavy marching order 692
The infantry pack 693

LANDING FORCE

EACH ship, division, and fleet has a permanently organized landing force, composed of infantry, artillery, machine gun, and other units as provided. The service required of the landing force may vary from police duty in a country where a state of anarchy or revolution exists to the hardest kind of offensive operations against an enemy on shore.

The station of every man for a landing force is given in the landing force bill posted on the crew's bulletin board. Any man uncertain as to his duties should consult his division officer. The full details of a landing force are given in the *Landing Force Manual*. Certain excerpts are given below.

Light marching order.—The various members of the rifle squad normally carry the articles of equipment listed below under "Light Marching Order":

LIGHT MARCHING ORDER

Item	Number in squad							
	2	6	5	1	3	17	4	8
Bandoleer, B. A. R.	..	..	1	..	..	..	..	..
Bandoleers, B. A. R., extra[2]	..	..	..	..	..	..	..	..
Bayonet, with scabbard	1	1	1	1	1	[3]1	..	1
Belt, cartridge, rifle, M-1910	1	1	1	1	1	[3]1	1	1
Belt, pistol, web, M-1912 (without magazine carrier)	..	..	..	..	..	[4]1	..	..
Can, meat[5]	1	1	1	1	1	1	1	1
Canteen, cover and cup, M-1910	1	1	1	1	1	1	1	1
Cap, white; watch (sailor's), or cap, garrison (marine's)[6,7,8]	1	1	1	1	1	1	1	1
Carrier, grenade	..	[6]1	..	..	..	..	..	..
Carrier, magazine, type XX (5 cells)	..	..	..	..	..	[4,6]2	..	..
Carrier, pack, haversack	1	1	1	1	1	1	1	1
Cutters, wire, intrenching and carrier	..	..	..	1	..	..	..	..
Discharger, rifle grenade and carrier	..	[6]1	..	..	..	..	..	..
Filler, magazine for B. A. R.	..	..	1	..	..	..	1	..

LIGHT MARCHING ORDER *(Continued)*

Item	Number in squad							
	2	6	5	1	3	[1]7	4	8
Fork, haversack[5]	1	1	1	1	1	1	1	1
Guns, Thompson submachine, caliber .45, M-1928	..	..	..	..	..	[4]1	..	..
Haversack	1	1	1	1	1	1	1	1
Helmet, steel[6]	1	1	1	1	1	1	1	1
Kits, spare part, for TSMG, complete	..	..	..	..	..	[4-6]1	..	..
Kit, toilet; with tooth brush, razor, comb, dentifrice, shaving cream, mirror, soap, soap box, towel, sewing kit, extra pair of legging and shoe laces, and, if used, shaving brush, hair brush, matches, and tobacco[9]	1	1	1	1	1	1	1	1
Knife, haversack[5]	1	1	1	1	1	1	1	1
Machette, intrenching, with scabbard	1	..	..	1	..	..	..	..
Magazine, box type XX, 20 cartridges	..	..	..	..	..	[4-6]9	..	..
Magazines, for B. A. R.	..	..	6	..	..	..	9	..
Magazines, for B. A. R. extra[2]	..	..	..	..	..	..	..	..
Mask, gas[6]	1	1	1	1	1	1	1	1
Mattock, pick, intrenching, with carrier	..	1	1	..	..	..	..	..
Overcoat[7]	1	1	1	1	1	1	1	1
Package, first aid, with pouch	1	1	1	1	1	1	1	1
Poncho, rubber	1	1	1	1	1	1	1	1
Pouch, meat can, haversack	1	1	1	1	1	1	1	1
Ration, cooked[7-9]	1	1	1	1	1	1	1	1
Ration, reserve[6-9]	1	1	1	1	1	1	1	1
Rifle, automatic, caliber .30, Browning M-1918; cover, front sight; brush, chamber clean case, accessories and spare parts; brush and thong; gun sling; parts, spare, field; belt, magazine	..	..	..	..	..	..	1	..
Rifle, U. S. Caliber .30, M-1903, with brush and thong, cover front sight, case, oiler and thong, sling, rifle	1	1	1	1	1	[3]1	..	1
Shovel, intrenching and carrier	..	..	..	..	1	1	1	..
Sling, gun, web, M-1903, rifle	..	..	..	..	..	[4-6]1	..	..
Socks, pairs[9]	1	1	1	1	1	1	1	1
Spoon, haversack[5]	1	1	1	1	1	1	1	1
Tag, identification, with tape	1	1	1	1	1	1	1	1

HEAVY MARCHING ORDER

Item	Number in squad							
	2	6	5	1	3	7	4	8
All of the above, plus the following:								
Blanket[8]	1	1	1	1	1	1	1	1
Drawers[8]	1	1	1	1	1	1	1	1
Jumper (sailor's)[8]	1	1	1	1	1	1	1	1
Pins, tent, shelter, round[8]	5	5	5	5	5	5	5	5
Poles, tent, shelter[8]	1	1	1	1	1	1	1	1
Shoes, pair[8]	1	1	1	1	1	1	1	1
Shirt, cotton or flannel (marine's)[8]	1	1	1	1	1	1	1	1
Socks, pairs[8] (total, 2 pairs)	1	1	1	1	1	1	1	1
Tent, shelter, half[8]	1	1	1	1	1	1	1	1
Trousers[8]	1	1	1	1	1	1	1	1
Undershirts[8]	1	1	1	1	1	1	1	1

[1] Thompson submachine gunner when equipped with the TSMG. If the squad leader is so equipped instead of No. 7, omit all items relating to the B. A. R., and substitute those relating to the TSMG.
[2] As prescribed in orders.
[3] Except when armed with TSMG.
[4] When armed with TSMG.
[5] Carried in meat-can pouch.
[6] When issued.
[7] When prescribed by commanding officer.
[8] Carried in roll.
[9] Carried in haversack.

Heavy marching order includes the clothing and equipment listed for "Light Marching Order," and the additional articles shown under "Heavy Marching Order."

THE INFANTRY PACK

To assemble the heavy marching order pack.—(*a*) *To assemble the pack carrier* to the haversack, spread the haversack on the ground, inside down, suspender side of the haversack up, outer flap to the front. Place the buttonholed edge of the pack carrier under the buttonholed edge of the haversack, binding straps of the carrier up, center row of buttonholes of the carrier resting under the corresponding buttonholes

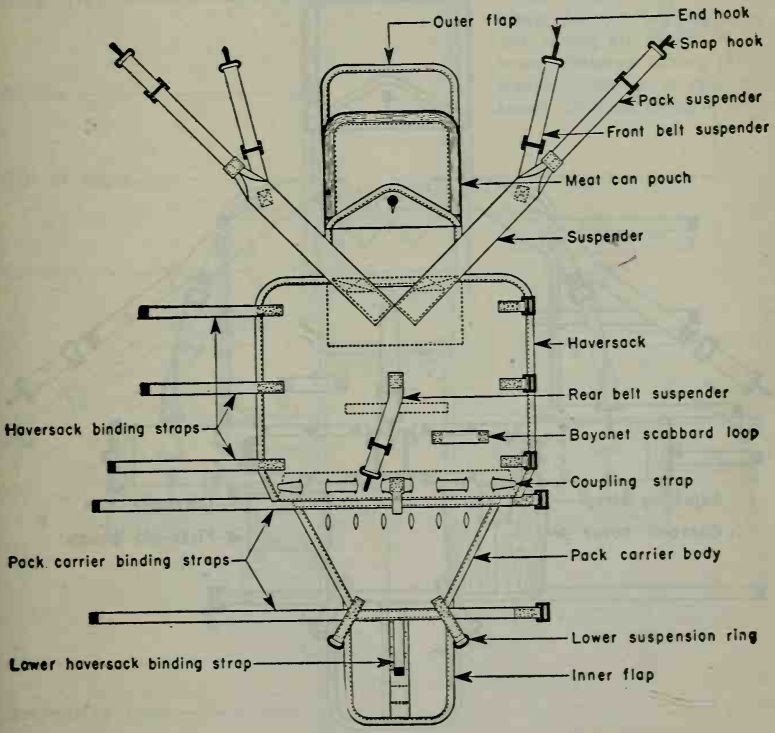


FIG. 55-1—Haversack and pack carrier assembled.

of the haversack. (The center row of buttonholes of the pack carrier is suited to a roll of the over-all length of the bayonet; for a longer roll, or when a large package of reserve rations is carried, use the upper row of buttonholes; for a shorter roll, use the lower row of buttonholes.) Lace the carrier to the haversack by passing the ends of the coupling strap down through the corresponding buttonholes of the haversack and carrier nearest the center, passing the ends up through the next buttonholes and continuing to the right and left, to the sides, until they are linked together (see Fig. 55-1).

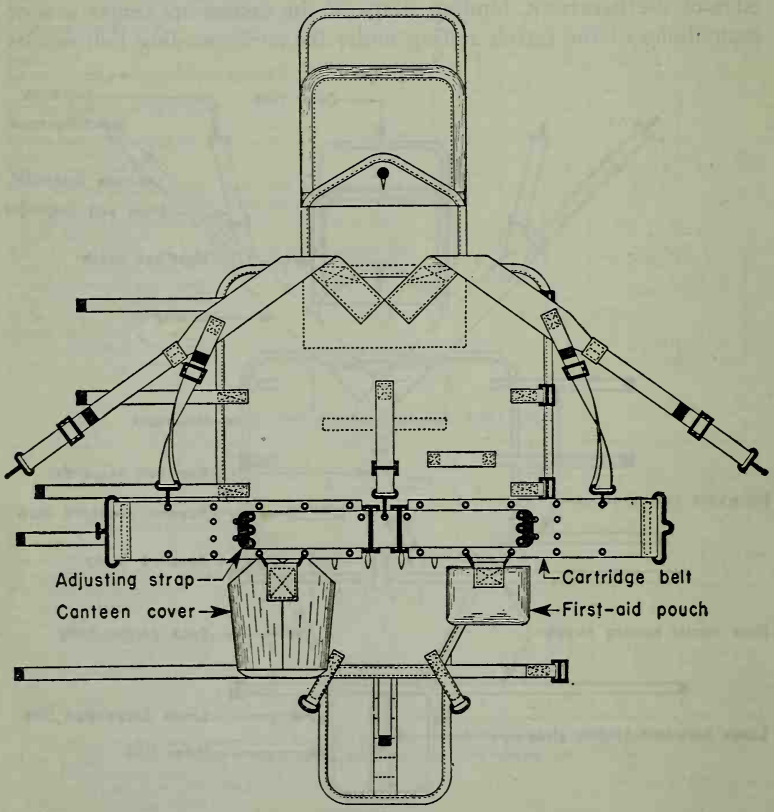


FIG. 55-2—Cartridge belt attached to haversack.

(*b*) *To attach the cartridge belt* to the assembled pack carrier and haversack, spread the pack carrier and haversack on the ground, inside down, suspender side of the haversack up, and place the cartridge belt, adjusted to the man, pockets down, tops to the front, along the junction of the haversack and carrier. Insert the end hook of rear belt suspender in the eyelet in the top center of the adjusting strap of the cartridge belt, the end of the hook outside of the belt. Insert hooks of front belt suspenders in the top eyelets between the first and second or second and third pockets (depending on size of man) from the male and female fasteners (see Fig. 55-2).

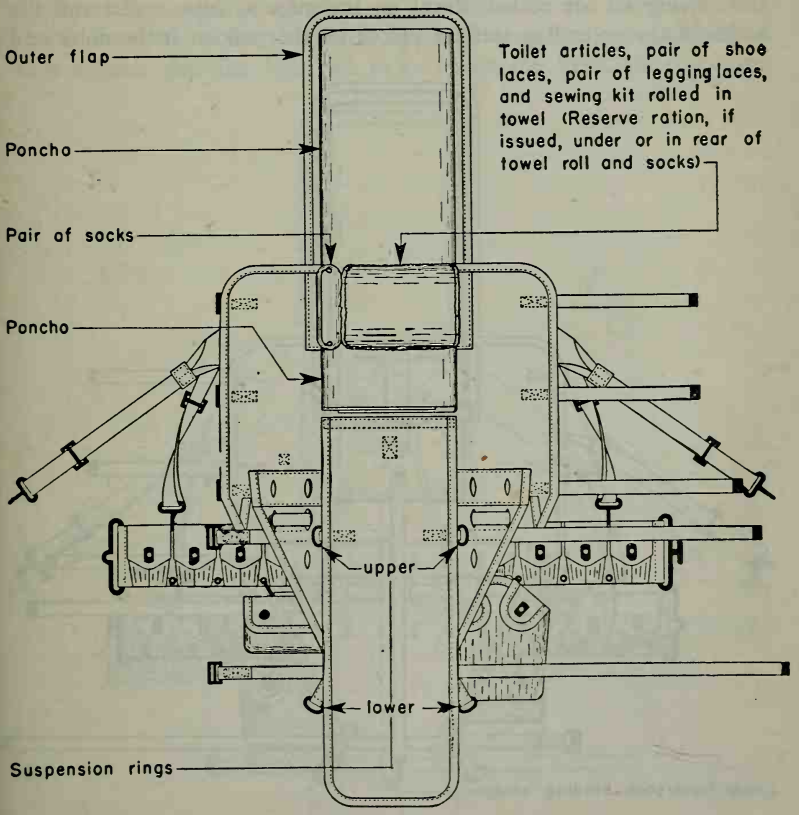


FIG. 55-3—Poncho, toilet articles, etc., assembled.

(*c*) *To assemble heavy marching order equipment* with toilet articles, poncho, and reserve rations:

(1) Place the assembled pack carrier, haversack, and cartridge belt on the ground, suspender side of the haversack down, pockets of cartridge belt up, haversack spread out, outer flap extended to the front, pack carrier and inner flap extended to their full length to the rear.

(2) The poncho is folded to the width and length of the inner flap and laid on the haversack extending from the top edge of the inner flap to within 1 inch of the outer edge of the outer flap.

(3) Toilet articles, one pair of shoe laces, one pair of legging laces, and sewing kit are rolled, towel on the outside, into a neat roll the width of the outer flap and are placed on the poncho at the outer end

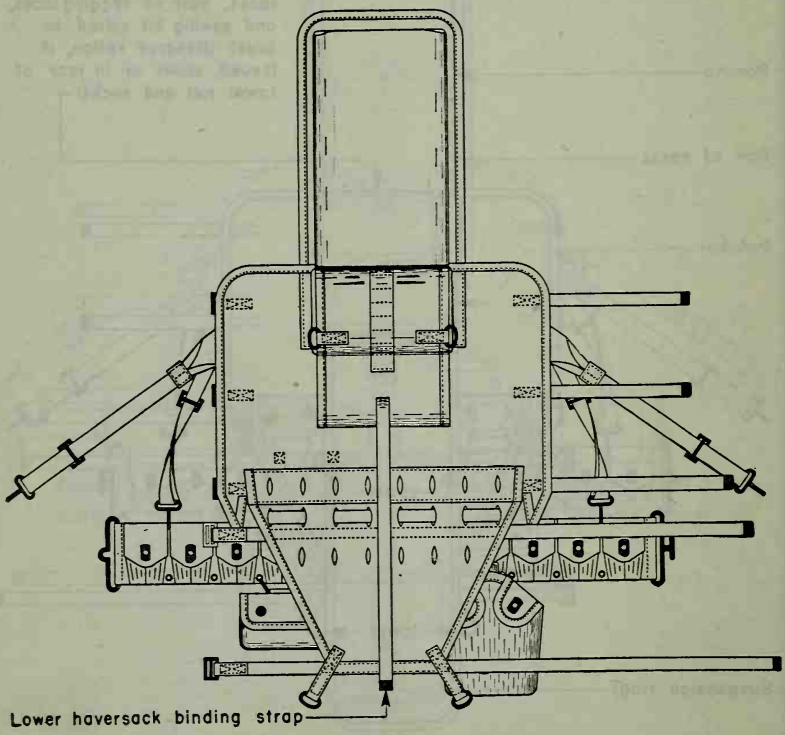


FIG. 55-4—Inner flap folded over toilet articles.

of the haversack, its forward edge even with the rear end of the outer flap. A pair of socks is placed next to the towel roll so they will be easily accessible on the march. A reserve ration, if issued, will be placed on the poncho and haversack in rear of or under the rolled towel depending on its size (see Fig. 55-3). The inner flap is folded over and forward of the above articles and then back under them (see Fig. 55-4).

(4) The sides of the haversack are folded over the sides of the assembled towel, reserve ration, and rear end of the poncho; the upper binding strap (or the two upper binding straps if the reserve ration as carried extends below the middle strap is passed through the loop on the inner flap opposite its point of attachment to the haversack body and is fastened to the tongueless bar buckle on the opposite side in such manner that the free end tucks inside the haversack, the strap

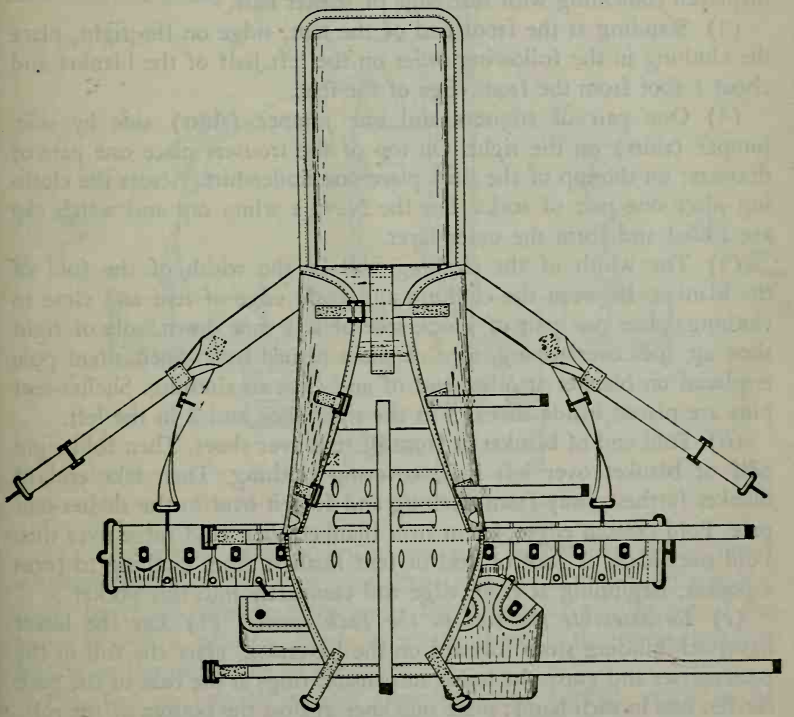


FIG. 55-5—Haversack sides folded over toilet articles.

having been first pulled tight to make the fastening secure (see Fig. 55-5).

(*d*) *To assemble the heavy marching order roll,* (1) Spread the shelter half with guy rope attached on the ground with tie-ties up, triangular end away from the man. Lay tie-ties and guy rope across shelter half and fold triangular end over toward the man, making it a rectangle.

(2) Spread blanket on shelter half, stripes parallel to ridge, with name down and end bearing name on side of ridge. Fold ends of blanket over so they meet in center. This will make a long roll. For a short roll, the blanket ends should overlap, the extreme overlap being 8 inches. Move blanket so that edge rests on ridge, which leaves from 18 to 26 inches of tent exposed at bottom of tent, front edge of blanket as displayed coinciding with rear edge of shelter half.

(3) Standing at the front end of the tent, ridge on the right, place the clothing in the following order on the left half of the blanket and about 1 foot from the front edge of the tent.

(4) One pair of trousers and one jumper (shirt) side by side, jumper (shirt) on the right. On top of the trousers place one pair of drawers; on the top of the shirt place one undershirt. Across the clothing place one pair of socks. For the Navy a white cap and watch cap are added and form the outer layer.

(5) The width of the clothing will be the width of the fold of the blanket. Between the clothing and front edge of tent and close to clothing, place one pair of shoes, sole of left shoe down, sole of right shoe up, toes overlapping, tops of shoes turned back. Shelter-tent pole is placed on blanket at other end of and close to clothing. Shelter-tent pins are placed inside shoes, 3 in the right shoe and 2 in the left.

(6) Fold end of blanket at front of tent over shoes. Then fold right half of blanket over left half, covering clothing. Then take end of blanket farthest away from clothing and fold it over to the shelter-tent pole. Fold bottom edge of tent over blanket, then fold ridge over this. Fold over about 1 foot of end of tent farthest from clothing to form a pocket. Beginning at front edge roll compactly into this pocket.

(*e*) *To assemble the roll to the pack carrier,* (1) Lay the lower haversack binding strap forward on the haversack, place the roll in the pack carrier and grasp the lower suspension rings at the base of the pack carrier, one in each hand; place one knee against the bottom of the roll; pull the carrier down and force the roll up close against the bottom of the packed haversack; without removing the knee, pass the lower

pack carrier binding strap over the roll and up through the nearer aperture of the tongueless bar buckle and down through the farther aperture, pull tight, and tuck away the free end; pass and secure in similar manner the upper pack carrier binding strap, and then the remaining binding straps (see Fig. 55-6).

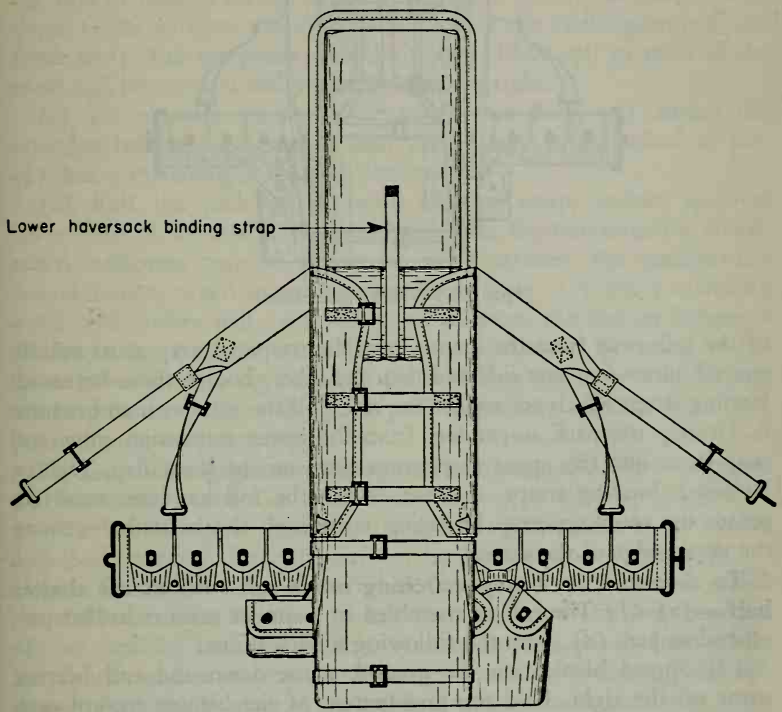


FIG. 55-6—Roll assembled to pack carrier.

(2) Engage the snap hooks on the pack suspenders in the lower suspension rings. Fold down outer flap (and end of poncho); pass the lower haversack binding strap under the bottom or middle one of the three haversack binding straps, then up through the tongueless bar buckle on the inner side of the outer flap.

(3) The equipment is now assembled and packed, ready to be adjusted to the man (see Fig. 55-7).

(*f*) *To discard the roll without removing the equipment from the body.* (Men work in pairs, assisting each other.) Pull the lower end

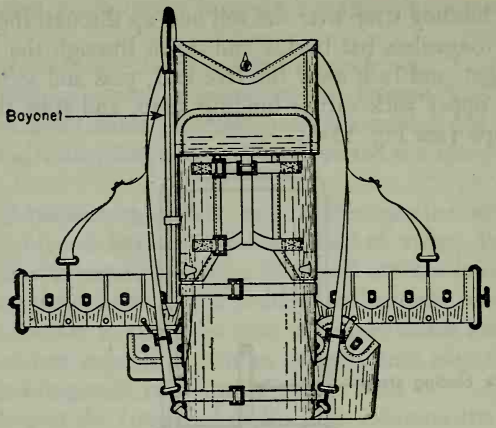


FIG. 55-7—Pack assembled.

of the roll away from the man. Grasp the coupling strap at its middle and withdraw first one side and then the other. Loosen those haversack binding straps which are around the roll, pull the roll down and remove it. Unsnap the pack suspenders from the lower suspension rings and snap them into the upper suspension rings on the inner flap. Tighten haversack binding straps, if loose. When the roll has been removed, secure the coupling strap by lacing it through the buttonholes along the upper edge of the carrier.

To assemble the heavy marching order roll without the shelter half.—(*a*) (1) The roll is assembled in a similar manner to that prescribed in par. (*d*), with the following modifications:

(2) Spread blanket on the ground, name down and end bearing name on the right. Fold top and bottom of the blanket toward each other until they meet in the center, or overlap (if short roll is desired).

(3) Place clothing as described for heavy marching order roll on the near side of the left flap of the blanket, and about 1 foot from its rear edge. Place the shoes as described for heavy marching order roll next to the clothing and on the near side of the left flap. Fold near side of the blanket over the shoes. Fold right half of the blanket over the left half. Fold far side of the blanket over about 1 foot to form a pocket. Beginning at the clothing end of the roll (near side) roll compactly into the pocket.

(*b*) If it is desired to show name of man on outside of blanket roll

as a means of identification of the roll, spread blanket on the ground, name down and end bearing name to the front. Lay clothing as described for heavy marching order, except that center line of clothing is on center line of blanket. Place shoes in rear of clothing. Fold near end of blanket over shoes. Fold right side of blanket over clothing. Fold left side of blanket on top of right side. Fold far end of blanket over about 1 foot to form a pocket. Beginning at the clothing end of roll (near end), roll compactly into the pocket. Place roll in pack so the name will be exposed and with top letters to right.

(*c*) *To assemble the light marching order pack,* (1) Attach the cartridge belt to the haversack and pack carrier as prescribed in par. (*b*) heavy marching order with shelter half.

(2) Roll the pack carrier, with binding straps inside, up over lower edge of haversack. Place and secure in the haversack the towel, rolled with one pair of socks and toilet articles; the poncho and reserve rations, when issued, as prescribed in par. (*c*) heavy marching order with shelter half; and secure, in addition, the bottom haversack binding strap. Fold the outer flap over and secure it by means of the lower haversack binding strap and the buckle on its under side. Engage the snap hooks on the ends of the pack suspenders with the upper suspension rings on inner flap.

To assemble equipment and special equipment.—(*A*) Equipment will be worn or carried as designated below: (1) *Bayonet scabbard.*—(*a*) To the haversack: Attach the scabbard to haversack in the eyelets and loop provided. Place the bayonet in the scabbard, ring to rear.

(*b*) To the cartridge belt: When haversack is not carried, attach the scabbard under the third pocket from the front of the left section of the cartridge belt. To do this, remove first-aid pouch from under the fourth pocket and attach it under the fifth pocket of the left section. Place the bayonet in the scabbard ring to the front.

(2) *Canteen cover.*—(*a*) To the cartridge belt: Attach canteen cover to the cartridge belt under the fourth or fifth pocket from the front of the right section of belt.

(*b*) To magazine belt: Worn on right hip.

(*c*) To the pistol belt: (1) Worn on left hip. (2) Worn on right hip when Thompson submachine gun is carried.

(3) *First-aid pouch.*—(*a*) To the cartridge belt: When the haversack is carried, attach the first-aid pouch under the fourth or fifth pocket from the front of the left section of the cartridge belt. When the haversack is not carried, attach the first-aid pouch under the fifth (rear)

pocket of the left section of the belt. This provides room for the bayonet scabbard when carried on the belt.

(*b*) To magazine belt: Worn on left hip.

(*c*) To the pistol belt: (1) Worn in rear of pistol or Very's pistol. (2) Worn in rear of left hip when Thompson submachine gun is carried.

(4) *Intrenching-tool carrier.*—Attach the intrenching-tool carrier to the intrenching-tool attachment. Place the intrenching-tool in its carrier and secure it by means provided on the intrenching-tool carrier. Secure the intrenching tool to the pack by means of a haversack binding strap.

(5) *Helmet.*—(*a*) To the haversack: Attach the helmet by placing the chin strap over the meat-can pouch; the chin strap is then secured by tying it on with a cord (shoe or legging lace).

(*b*) When worn: The strap is worn around the back of the neck.

(6) *Magazine belt.*—Magazine-base plates up, catches toward the buckles of the belt.

(7) *Pistol belt.*—Magazine-base plates up, prolonged ends of the magazine-base plates toward the right (toward the buckle).

(*B*) Special equipment will be worn or carried as designated below:

(1) *Ammunition jacket (carrier), trench mortar.*—On top of all equipment except the gas mask.

(2) *Bandoleer, magazine, for Browning automatic rifle* (when carried by substitute automatic rifleman).—Suspended on left side by a strap passed over the right shoulder.

(3) *Bandoleer, magazine, for Browning automatic rifle* (extra).—Suspended on either side by a strap passed over the opposite shoulder.

(4) *Brassards.*—Worn on left arm.

(5) *Carriers, magazine, type XX, Thompson submachine gun.*—On pistol belt in front, one carrier at left of buckle, one carrier at right of buckle.

(6) *Case, dispatch.*—Suspended on the right side by a strap passed over the left shoulder.

(7) *Clinometer, trench mortar.*—Suspended on the left side by a strap passed over the right shoulder.

(8) *Clinometer, machine gun.*—On the belt in front of the pistol.

(9) *Compass, case.*—On the belt in front of the pistol.

(10) *Compass, pocket.*—Carried in breast pocket.

(11) *Cutter, wire, small.*—Attached to the left side of the belt in front of the first-aid pouch.

(12) *Discharger, rifle grenade.*—On the belt in front of the first-aid pouch.

(13) *Gas mask.*—Worn under the left arm and over all other equipment, suspended by a strap passed over the right shoulder.

(14) *Glasses, field.*—On the left side, suspended from the belt or by a strap passed over the right shoulder.

(15) *Haversack, officer's type, with strap.*—Suspended on the left side by a strap over the right shoulder (officers).

(16) *Haversack, officer's type.*—Suspended from pistol belt in front of canteen (chief petty officers or non-commissioned officers).

(17) *Instrument, angle of sight.*—On the right side, suspended by a strap passed over the left shoulder.

(18) *Kit, flag, combination.*—On right side, suspended by a strap passed over the left shoulder. Worn over all equipment except the gas mask.

(19) *Kit, spare part complete, Thompson submachine gun.*—Rear pocket of carrier, on the left side.

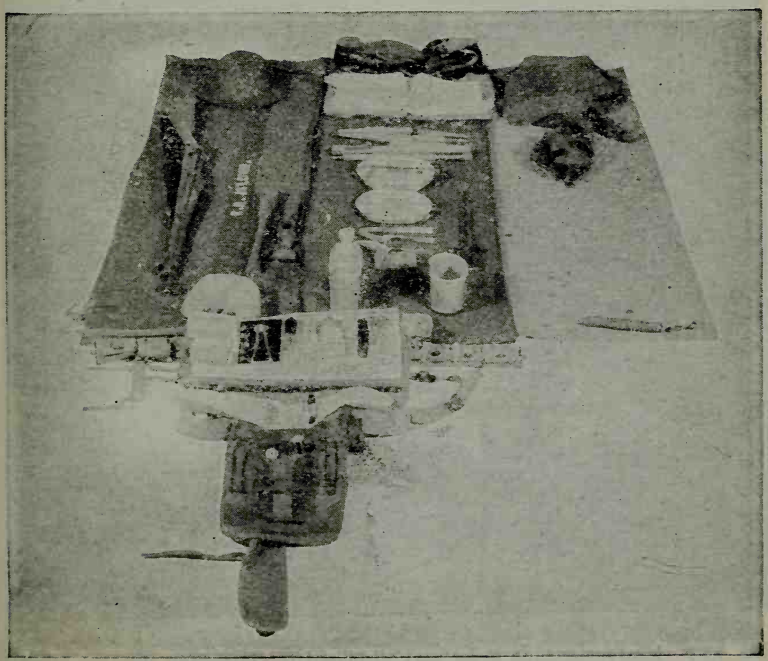


FIG. 55-8—Heavy marching order pack displayed for inspection.

(20) *Lanyard, pistol.*—(*a*) Without shoulder strap: Worn over left shoulder and under right arm.

(*b*) With shoulder strap: Around right shoulder and under strap.

(21) *Machete, with carrier.*—As prescribed for intrenching tools.

(22) *Pick, mattock, with carrier.*—As prescribed for intrenching tools.

(23) *Pistol and holster.*—On the right hip.

(24) *Pistol, Very's, with holster.*—Same as the pistol. When worn together, the Very's pistol is worn in rear of the pistol.

(25) *Sight, quadrant, for 37-mm. gun.*—On the left side, suspended by a strap passed over right shoulder.

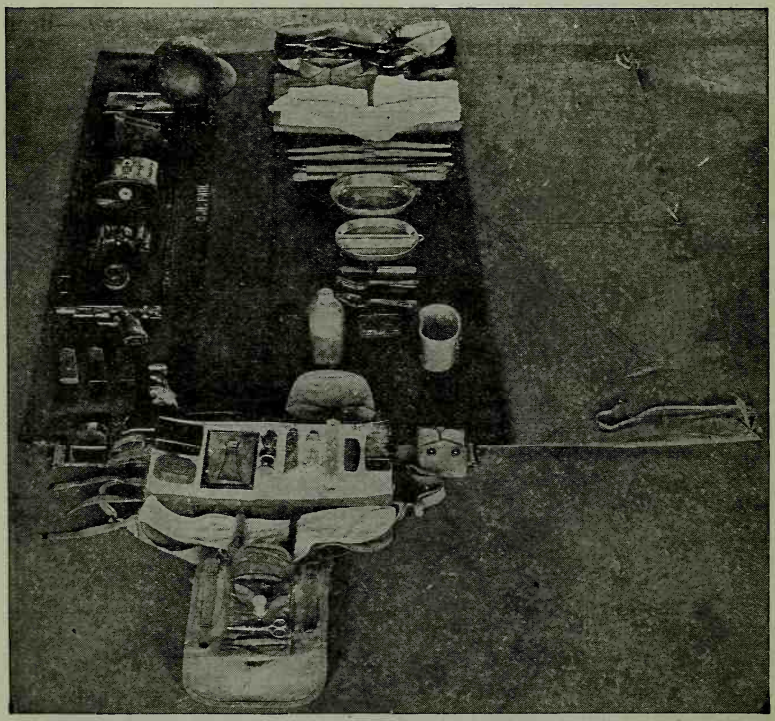


FIG. 55-9—Heavy marching order pack displayed for inspection showing pistol, lanyard, whistle, and field glasses.

(26) *Sight, telescopic, for 37-mm. gun.*—On the left side, suspended by a strap passed over the right shoulder.

(27) *Sight, telescopic, rifle.*—On right side, suspended by a strap passed over the left shoulder.

(28) *Suspenders, cartridge belt, pistol.*—Worn by Thompson submachine gunner, except when pack is carried.

(29) *Trumpet.*—Suspended on left side by sling passed over the right shoulder.

(30) *Whistle.*—Carried in left breast pocket.

Appropriate adjustments in placing of or wearing of equipment on belt will be made to suit the measure of waist or conformation of the man.

Equipment laid out for inspection is shown in Figs. 55-8, 55-9, and 55-10.

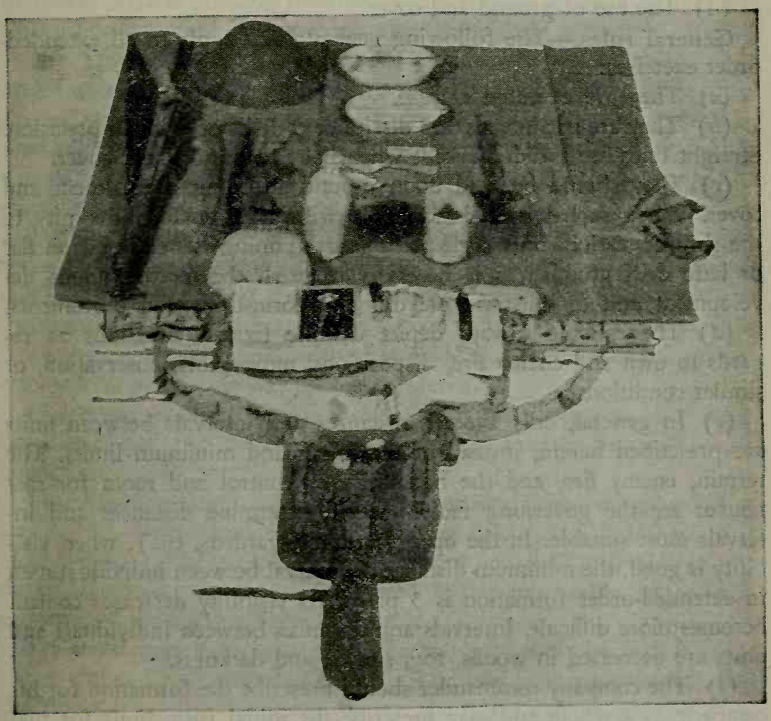


FIG. 55-10—Light marching order pack displayed for inspection.

CHAPTER 56

EXTENDED ORDER

Extended-order exercises 706
Combat principles of the rifle squad and platoon 713
Combat signals 724

EXTENDED-ORDER EXERCISES

THE extended-order exercises and combat principles prescribed in this chapter are based on a platoon of 3 rifle squads.

The purposes of extended-order exercises are to teach:

(1) The mechanism of deployment.

(2) Formations for use under fire.

(3) Methods of advancing in combat.

(4) The use of ground and cover.

General rules.—The following general rules apply to all extended-order exercises:

(*a*) They are executed at ease.

(*b*) They are not intended as disciplinary drills or drills of precision. Straight lines are avoided except when halted behind linear cover.

(*c*) They should be held upon ground affording concealment and cover. When such terrain is available within reasonable proximity to the ship or station, only such preliminary training is permitted on flat or bare drill grounds as is necessary to teach the mechanism of development and to illustrate the different formations and movements.

(*d*) They should always depict definite tactical situations as regards to own and enemy fire, dispositions, movements, observation, or similar conditions.

(*e*) In general, only average distances and intervals between units are prescribed herein, instead of maximum and minimum limits. The terrain, enemy fire, and the necessities of control and room for maneuver are the governing factors which determine distances and intervals most suitable. In the open (pastures, gardens, etc.), when visibility is good, the minimum distance or interval between individual men in extended-order formation is 5 paces. As visibility decreases control becomes more difficult. Intervals and distances between individuals and units are decreased in woods, fog, smoke, and darkness.

(*f*) The company commander should prescribe the formation for his company as a whole and may prescribe the initial formations for platoons and squads. However, during the advance, the leaders of platoons

and squads should be given full initiative in varying the formation of their units so as to make best use of ground and cover.

(*g*) In combat, important responsibilities will devolve upon the petty officer; therefore, in extended-order exercises, he should be given opportunity for developing initiative and leadership.

(*h*) The platoon leader and senior petty officers control their squads through the squad leaders. They issue their orders to the squad leaders and then see that they are carried out.

(*i*) The prone position is the usual position for the skirmisher when deployed and when not advancing. The sitting or kneeling position may be used by him when necessary to obtain a better field of fire.

(*j*) Platoon leaders deploy, assemble, and maneuver their units as far as practicable by arm signals. The use of the whistle as a preliminary to a command is retained for the fire fight when, on account of the noise of battle, it is impossible to attract the attention of petty officers and skirmishers by other means. For authorized signals see pages 724-727.

(*k*) Changes in the direction of march are usually accomplished by assigning a new march direction to the base squad. Skirmishers place themselves on the new front and re-establish their proper intervals by gradually opening out from or closing in on the base squad as may be necessary.

(*l*) Movements may be interrupted by the commands *HALT* or *DOWN*. On halting, a deployed line habitually faces to the front (direction of the enemy). If halted by the command *DOWN*, skirmishers take cover, and those in the assault wave or on an exposed flank place themselves in immediate readiness for opening fire.

(*m*) Deployment as skirmishers is made at a run. Other movements are made at a walk unless otherwise ordered.

Fire order.—(*a*) A fire order consists of three elements, *i.e.*, range, designation of the target, and order to commence firing. The sequence is:

(1) *Range.*—Being in any firing formation, rifles being loaded or loading being simulated, the commands are *RANGE, SIX HUNDRED* (*FIVE HUNDRED, THREE FIFTY*, etc.), or *BATTLE SIGHT*. At this command, sights are set as ordered. When practicable, squad leaders verify the sight setting on each rifle.

(2) *Designation of the target.*—The target must be specifically designated, either by a tracer bullet or by pointing with arm or rifle and describing it orally. The designation of the target may be omitted when the target appears suddenly and is unmistakable.

(3) *To commence firing.*—Being in any firing formation the command is *COMMENCE FIRING.* Each man, independently of the others, comes to the *Ready,* aims carefully and deliberately at the target, fires, reloads, and continues firing until ordered to cease firing.

(*b*) Examples of fire orders are: (1) 1. *RANGE, FIVE HUNDRED,* 2. *ENEMY THERE* (pointing), 3. *COMMENCE FIRING,* or (2) 1. *BATTLE SIGHT,* 2. *COMMENCE FIRING.* (In case the target appears suddenly and is unmistakable.)

Use of the bayonet.—When in extended order, the orders to fix bayonets or unfix bayonets will be executed promptly and in a manner most expeditious and convenient for the individual. The orders will not be executed in cadence.

To lie down.—Being at a halt, marching, or running, the command to lie down is *DOWN.* Whenever practicable, the prone and other firing positions are assumed as prescribed in the *Landing Force Manual.*

To move forward.—(*a*) If lying down, to move forward at a run, the commands are 1. *CEASE FIRING,* 2. *Prepare to rush,* 3. *UP* or *FOLLOW ME* (or other command requiring a move forward at a run).

(*b*) To move forward other than at a run from the position of lying down, the movement is executed at the command 1. *Forward,* 2. *MARCH.*

Use of cover.—During extended order exercises and in combat, all individuals are required to utilize available cover. The following points should be stressed:

(1) In taking advantage of cover, it must be possible to fire easily and effectively upon the enemy.

(2) When halted, remain motionless and expose the body as little as possible.

(3) Advance as close as possible to the enemy without firing. (Long-range rifle fire is not very effective.)

(4) While advancing, move as rapidly as possible from cover to cover, as a man appearing suddenly and running rapidly furnishes a poor target. Select the new position before leaving the old.

(5) Keep off the sky line.

(6) Make short halts. The longer a position is occupied the greater the danger of being located and subjected to accurate fire.

(7) Whenever possible, keep down and fire from the right side of cover (tree, bush, etc.)

(8) If possible, avoid looking over the top of concealment unless its outline is broken.

(9) Whenever practicable, cover should be improved by use of camouflage and digging.

(10) The proper advance of the platoon as a whole and the effectiveness of its fire are of greater importance than the question of cover for individuals.

(11) Concealment from hostile air observation is important.

Distances and intervals between men when deployed.—Five paces between men is the distance given; however, this is variable. The squad leader may direct lesser or greater intervals and distances and individual skirmishers vary their position so as to take full advantage of cover or concealment. Close grouping in the open is avoided, but two or three men may group together to take advantage of some good cover or concealment.

Dispositions.—Dispositions of the rifle squad are:

Squad column.
As skirmishers.
As skirmishers right (or left).
Squad wedge.

(*a*) *Squad column* (Fig. 56-1).—At the command given when the squad is disposed in any manner, its members form in an irregular column behind the squad leader. The disposition of individuals in the column will be adapted to the terrain and circumstances and may vary from a widely spaced and staggered column suitable for crossing very open country to a column of files closed up behind the leader.

(*b*) *As skirmishers* (Fig. 56-

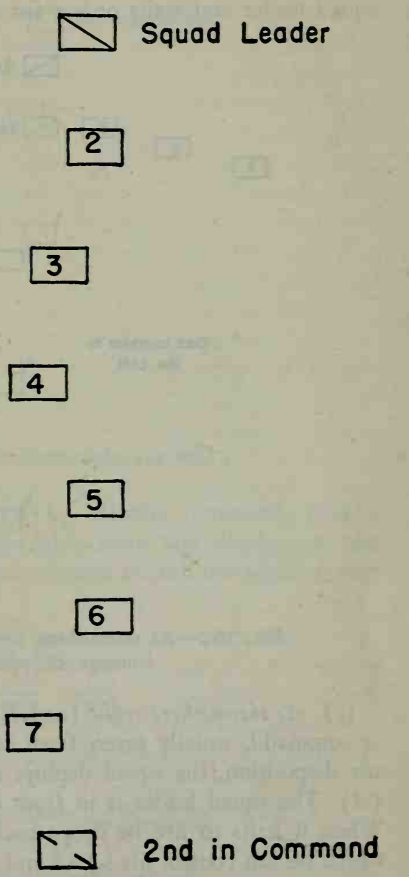


FIG. 56-1—Squad column (distance between men, 5 paces; depth of column, 40 paces; width, 5 to 20 paces).

2).—At the signal or command, usually given from squad column but permissible from any disposition, the squad deploys in an irregular line as shown in Fig. 56-2. Even numbers go to the right, odd numbers to the left. The squad leader is in front of his squad when it is advancing. When it halts to fire he drops back behind the line to a position from which he can control his squad and observe to the front. If there is an automatic rifleman in the squad, he joins the squad leader and waits orders for any special fire mission.

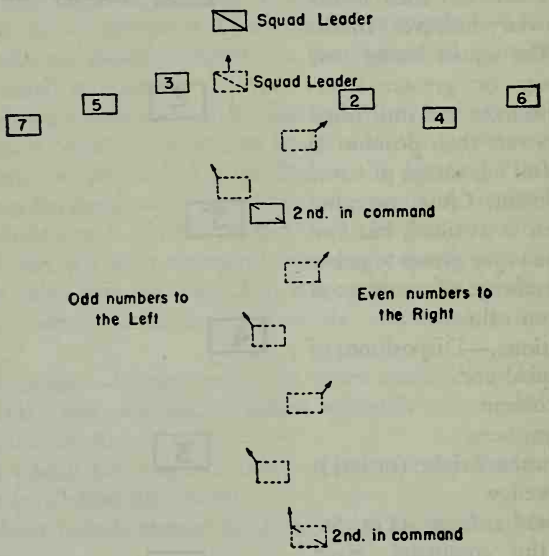


FIG. 56-2—As skirmishers (interval between men, 5 paces; frontage of squad, 40 paces).

(*c*) *As skirmishers right* (*or left*) (Fig. 56-3 (*A*)).—At the signal or command, usually given from squad column but permissible from any disposition, the squad deploys to the right as shown in Fig. 56-3 (*A*). The squad leader is in front of his squad when it is advancing. When it halts to fire he drops back behind the line to a point from which he can control his squad and observe to the front. If there is an automatic rifleman in the squad, he joins the squad leader and waits for orders for any special fire mission.

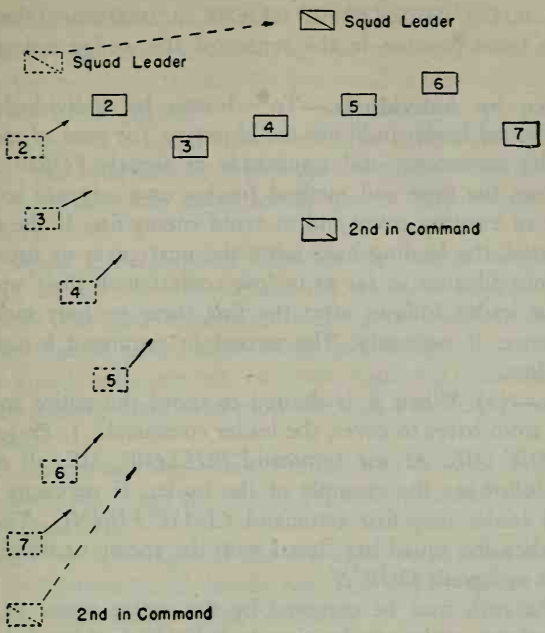


FIG. 56-3 (*A*)—As skirmishers right (or left).

(*d*) *Squad wedge* (Fig. 56-3 (*B*)).—At the command, usually given from squad column but permissible from any disposition, the men dispose themselves in an irregular wedge behind the squad leader

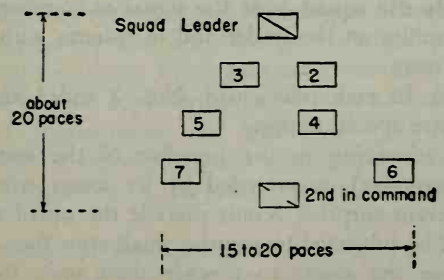


FIG. 56-3 (*B*)—Squad wedge.

as shown in Fig. 56-3 (*B*). If there is an automatic rifleman in the squad, he takes position in the center of the wedge unless otherwise directed.

Advance by individuals.—To advance by individuals (infiltration) the squad leader indicates the objective, the man or men who are to start the movement, and commands or signals *FORWARD*. Each man chooses the time and method for his own advance so as to take advantage of existing cover and to avoid enemy fire. If the objective is not indicated, the leading men select the next cover or firing position. They do not advance so far as to lose contact with their squad leader. The squad leader follows after the first three or four men directing their advance, if necessary. The second in command insures that the others follow.

Rushes.—(*a*) When it is desired to move the entire squad simultaneously from cover to cover, the leader commands. 1. *Prepare to rush,* 2. *FOLLOW ME.* At the command *FOLLOW ME,* all men spring forward, following the example of the leader. If necessary for safety, the squad leader may first command *CEASE FIRING.* The rush terminates when the squad has closed with the enemy or when the leader commands or signals *DOWN.*

(*b*) The rush may be executed by the entire squad as a unit, as explained above, or by any fraction or individuals thereof. In the latter case the leader designates the part of the squad, or the individuals, who are to make the rush and the next position.

Follow the squad leader.—The leader places himself in front of his unit and commands *FOLLOW ME.* The other members of the squad follow him, retaining the approximate disposition of the unit at the time when the command was given.

To Assemble the squad.—At the signal or command *ASSEMBLE,* the squad assembles on the leader and in column with 40 inches distance between men.

Scouts.—(*a*) In each rifle squad, Nos. 2 and 3 are designated as scouts and receive special training.

(*b*) When advancing in the presence of the enemy, the squad (platoon or company) is preceded by its scouts who seek out the enemy and prevent surprise. Scouts precede the squad at such distance that it will not be subjected to surprise small-arms fire.

(*c*) To cause the scouts to precede their unit, the command is *SCOUTS OUT.* The scouts move forward in front of their units and maintain contact with the unit from which sent out.

COMBAT PRINCIPLES OF THE RIFLE SQUAD

General.—(*a*) During the fire fight, the paramount duties of the squad leader are to enforce the fire discipline and to control the effectiveness of the fire of his squad.

(*b*) The control of a squad when under fire is difficult. When close to the enemy, the noise usually makes the use of the voice impossible. Under such conditions the squad leader moves from man to man to give his orders.

(*c*) The squad leader himself does not fire except under unusual circumstances, as when in defense and the enemy is beginning his assault. Normally it is more important for the squad leader to control the fire of 7 rifles than to have 8 rifles firing uncontrolled.

(*d*) The squad leader prevents excessive scattering when members of his squad are seeking cover. The more the squad scatters, the more difficult is control.

(*e*) The best protection from fire is well-directed and heavier return fire. Such fire keeps the enemy pinned down and prevents him from firing accurately.

(*f*) During the last stages of the fire fight, or at other times when control by the platoon leader has become lost, squad leaders will often have to conduct the attack without orders.

(*g*) Should the squad become separated from its platoon, it must under no circumstances fall back. Every effort must be made to locate and join near-by friendly troops. The squad then comes under the orders of the leader of these troops.

(*h*) Digging in.—If at any time the squad is unable to advance, men are placed in positions from which they can fire on the enemy or cover the ground to the front. Unless natural cover (ditch, building, etc.) is available, they should dig individual pits. These pits are holes (fox holes) dug hastily and deep enough to afford protection from rifle fire and shell fragments. In digging, men who have no intrenching tools should use canteen cups, knives, meat cans, or meat-can covers.

Direction of deployment and advance.—(*a*) The platoon is trained to deploy in any direction in silence and without confusion. The direction is indicated by the leader pointing or moving in the desired direction.

(*b*) The direction of advance may be indicated by the leader pointing or moving in that direction; by designating prominent terrain features such as building or lone tree; by magnetic azimuth; by indicating to the leader of the base unit the route to be followed; or

by any combination of the above. Where an advance is to take place in an assigned direction for a considerable time, both a distant direction point and a magnetic azimuth should be designated.

The base squad.—(*a*) The center squad is the base squad, with the following exceptions:

(1) When a platoon column, the leading squad is the base squad.

(2) When deployed in squad columns or as skirmishers with one squad back, the right flank squad is the base squad unless otherwise indicated.

(*b*) The other squads of the platoon maintain direction and relative position by regulating on the base squad.

Dispositions.—(*a*) The platoon may use any of the following dispositions:

(1) Column of threes.

(2) Column of twos.

(3) Platoon column (Fig. 56-4).

(4) Line of squads (Fig. 56-4).

(5) One squad forward, two squads back (Fig. 56-4).

(6) Two squads forward, one squad back (Fig. 56-4).

(*b*) When the platoon is deployed, each squad may be in *Squad column, Squad wedge,* or *As skirmishers.*

Frontage.—The platoon deploys with sufficient intervals between squads to permit minor maneuvers of squads. Unless otherwise directed, squad columns or squads disposed as a wedge keep about 50 yards apart. When deployed as skirmishers, adjacent squads deploy with about 20 yards interval between squads unless otherwise directed.

Posts of leaders, guide, messenger, and scouts.—The platoon leader and the second in command are not restricted to fixed posts. When moving forward, the platoon leader usually precedes his unit, the second in command follows in rear and assists in control. During forward or flank movements, the platoon leader is on the side of the platoon toward the enemy. During movements to the rear, he is on the side away from the enemy. When the platoon is halted in a firing position, he is in rear of his platoon. When otherwise halted, he is in front of his platoon. The second in command takes positions from which he can best assist the platoon leader in controlling the platoon. The platoon guide and the messenger join the platoon leader on deployment. When contact is imminent the platoon leader sends out scouts from the leading squads. No more scout pairs than are necessary to cover the front of the platoon will be used.

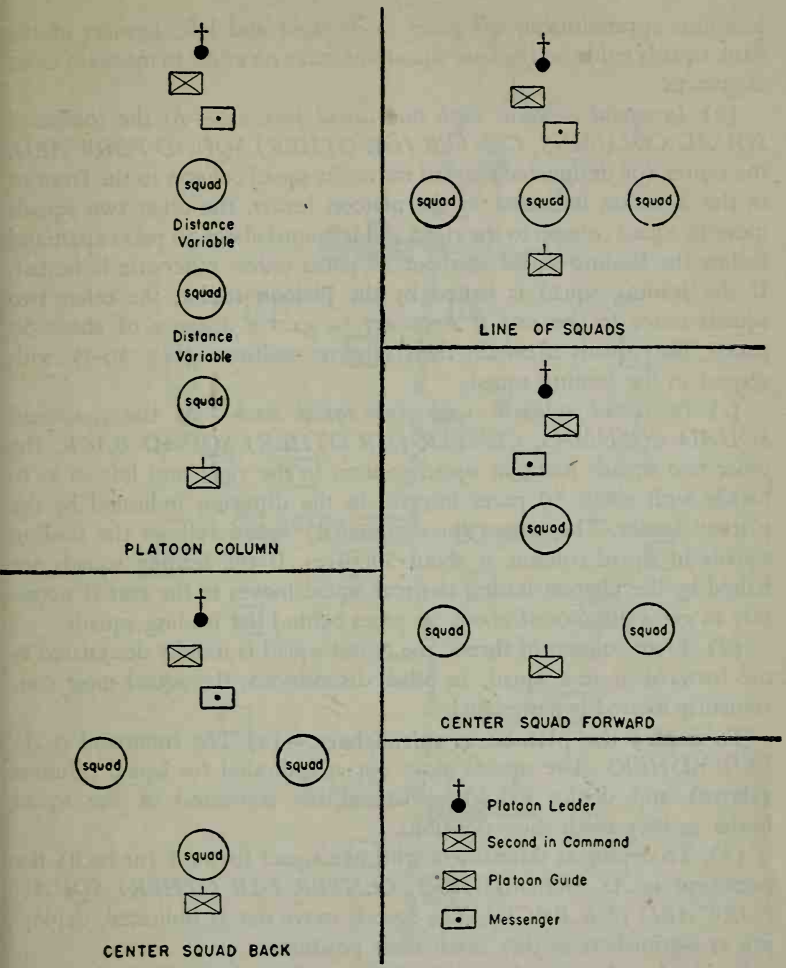


FIG. 56-4—Dispositions of the platoon.

Platoon column.—At the signal or command, the center squad moves out in squad column, followed in order by the right and left squads, or in any other order indicated by the platoon leader.

To deploy into squad columns.—(*a*) *With squad columns in line.*—The command is *SQUAD COLUMNS*. The center or leading squad moves in squad column to the front or in the direction indicated by the platoon leader. The other two squads move in squad columns to

positions approximately 50 paces to its right and left. Leaders of the flank squads guide on the base squad but make no effort to maintain exact alignment.

(*b*) *In squad columns with one squad forward.*—At the command *SQUAD COLUMNS, CENTER (OR OTHER) SQUAD FORWARD,* the center (or designated) squad moves in squad column to the front or in the direction indicated by the platoon leader, the other two squads move in squad column to the right and left until about 50 paces apart and follow the leading squad at about 50 paces unless otherwise indicated. If the leading squad is halted by the platoon leader, the other two squads move to the rear if necessary to gain a distance of about 50 paces. The squads maintain their relative positions (Fig. 56-4) with respect to the leading squad.

(*c*) *In squad columns with one squad back.*—At the command *SQUAD COLUMNS, CENTER (OR OTHER) SQUAD BACK,* the other two squads move in squad column to the right and left so as to march with about 50 paces interval in the direction indicated by the platoon leader. The center (or designated) squad follows the leading squads in squad column at about 50 paces. If the leading squads are halted by the platoon leader, the rear squad moves to the rear if necessary to get a distance of about 50 paces behind the leading squads.

(*d*) From column of threes, the center squad is usually designated as the forward or rear squad. In other dispositions, the squad most conveniently located is designated.

To deploy the platoon as skirmishers.—(*a*) The command is *AS SKIRMISHERS.* The squads move out as indicated for squad columns (above) and deploy as skirmishers at the command of the squad leader as they reach their positions.

(*b*) To deploy as skirmishers with one squad forward (or back) the command is *AS SKIRMISHERS, CENTER (OR OTHER) SQUAD FORWARD (OR BACK).* The squads move out as indicated, deploying as skirmishers as they reach their positions.

To deploy the squads as skirmishers.—The platoon being in squad columns, the platoon leader may deploy the squads as skirmishers by commanding *AS SKIRMISHERS.* At this signal or command the squads deploy, retaining their relative positions within the platoon.

To assemble the platoon.—The leader signals or commands *ASSEMBLE,* and points to the place where the assembly is to be made. The platoon assembles in column of threes.

To advance the platoon.—(*a*) The leader, assisted by the second in command, directs the advance of the platoon. To advance individual

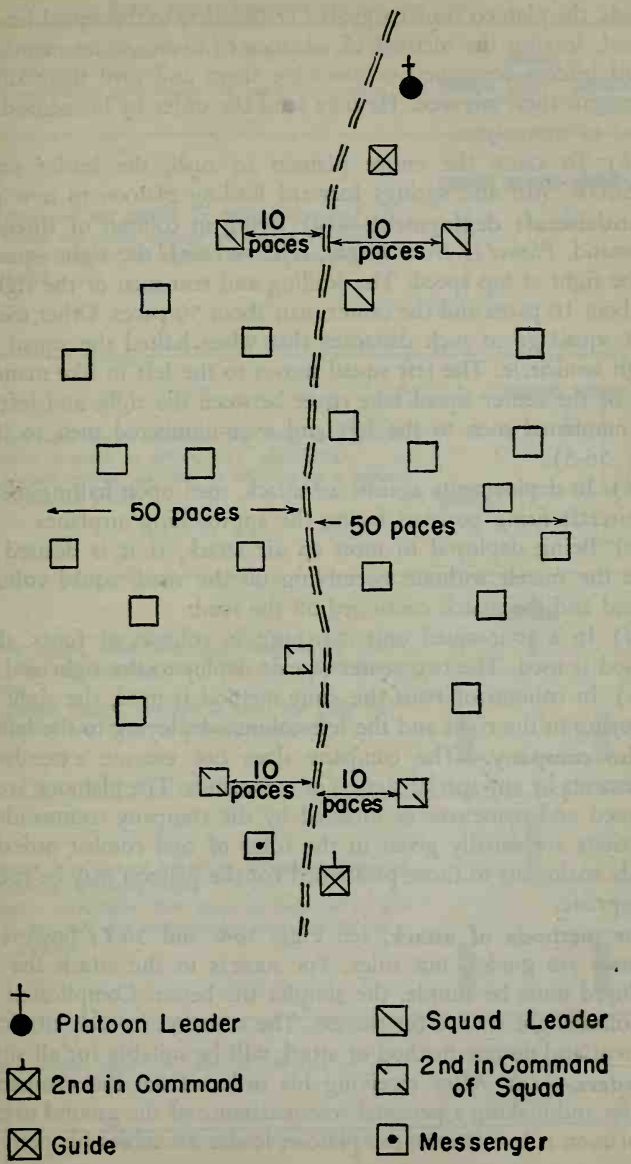


FIG. 56-5—Platoon antiaircraft deployment.

squads, the platoon leader signals *FORWARD* to the squad leaders concerned, leaving the method of advance to them, or he may go to the squad leaders concerned or assemble them and give them direct oral orders for their advance. He may send the order by his second in command or messenger.

(*b*) To cause the entire platoon to rush, the leader commands *FOLLOW ME* and springs forward leading platoon to new position.

Antiaircraft deployment.—(*a*) Being in column of threes, at the command, *Plane(s) from (right, left, or rear),* the right squad moves to the right at top speed. The leading and rear men of the right squad go about 10 paces and the center man about 50 paces. Other men of the right squad go to such distances that when halted the squad forms a rough semicircle. The left squad moves to the left in like manner. The men of the center squad take cover between the right and left squads, odd-numbered men to the left and even-numbered men to the right (Fig. 56-5).

(*b*) In deployments against air attack, men upon halting assume the antiaircraft firing position facing the approaching airplanes.

(*c*) Being deployed to meet an air attack, if it is desired to continue the march without assembling on the road, squad columns are formed and the march continued off the road.

(*d*) In a four-squad unit marching in column of fours, the same method is used. The two center squads deploy to the right and left.

(*e*) In column of twos the same method is used, the right column deploying to the right and the left column deploying to the left.

The company.—The company does not execute extended order movements by any special signals or commands. The platoons are usually disposed and maneuver as directed by the company commander. Such directions are usually given in the form of oral combat orders. Commands analogous to those prescribed for the platoon may be used when appropriate.

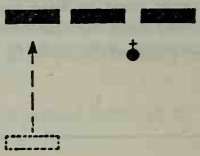
For methods of attack, see Figs. 56-6 and 56-7; however, these methods are guides, not rules. For success in the attack the method employed must be simple, the simpler the better. Complicated maneuvers offer slight chance for success. The situation in each attack will be different and no one method of attack will be suitable for all situations.

Orders.—(*a*) After receiving his orders from the company commander and making a personal reconnaissance of the ground over which his platoon is to advance, the platoon leader assembles his petty officers

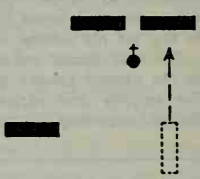
READ FIGURE FROM BOTTOM TO TOP

The platoon has assaulted with the bayonet and captured the enemy position.
It will reorganize and pursue the enemy or prepare a defensive position.

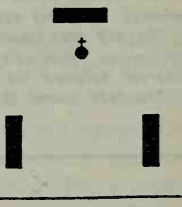
The firing line has gained its new position, and the support squad has been ordered to extend the firing line so as to increase its volume of fire preparatory to the assault.



The right rear squad extended the firing line by infiltration which resulted in gaining fire superiority.
The platoon leader decided to advance by a platoon rush of about 50 yards.



Leading squad, when fired upon, deployed as skirmishers, thus establishing the firing line. Rear squads took cover.
The platoon leader decided to send the right rear squad forward and hold the other in support.



Advancing from line of departure. Triangular formation. Squad columns. Bayonets fixed.
A platoon messenger (not shown in diagram) is observing to the left and maintaining contact with the adjacent platoon.

Platoon under cover in rear of the line of departure (an unimproved road).

READ FIGURE FROM BOTTOM TO TOP

FIG. 56-6—An example of a platoon, as a part of a larger force, advancing in the open against an enemy holding the outskirts of a town.

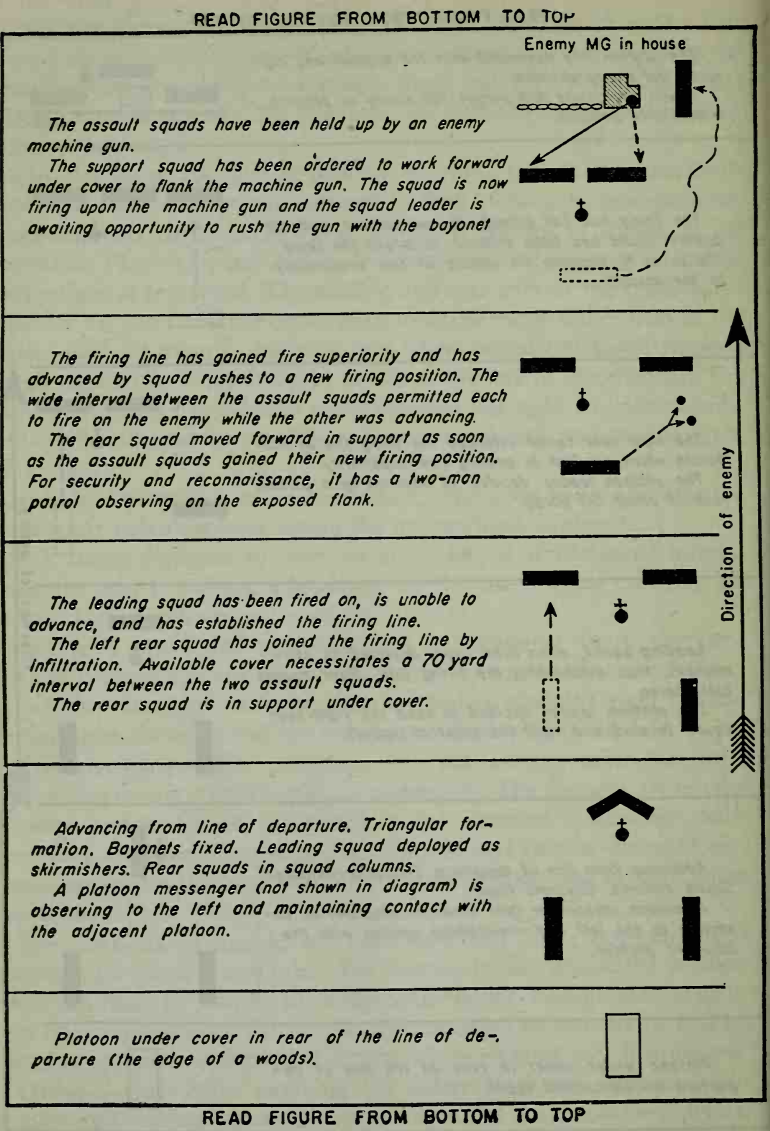


FIG. 56-7—An example of a platoon, as a part of a larger force, advancing in the open against an enemy holding a village.

and issues his orders. Whenever practicable, orders should be issued in the presence of the entire platoon.

(*b*) During the course of the attack it may be necessary for the platoon leader to issue additional orders to cope with the various situations as they arise. For example:

(1) A platoon is advancing in triangular formation. The leading (assault) squad has been stopped on the forward slope of a ridge by hostile fire. Rear squads are under cover of the ridge, squad leaders near the crest watching for signals.

(2) The platoon leader sends a messenger to the squad leaders of the rear squads with the following orders:

Right squad, re-enforce the firing line on the right. I will indicate enemy position and flanks with tracer ammunition, range five hundred. Left squad, support squad. Keep under cover and conform to movements of firing line. Keep sharp lookout on flanks. Signal when message is received and understood and right squad is ready to advance.

(3) A well-trained, intelligent messenger can transmit this order verbally. If there is any doubt, write it out and send it by the messenger.

Advancing the attack.—(*a*) Except when it is necessary to go around impassable obstacles or areas, the platoon should not leave its assigned zone of action.

(*b*) *Flanking movements.*—The platoon is essentially an attack unit. Wide flanking movements by any part of the platoon are rarely justified. Maneuvering in the zone of an adjacent platoon is always dangerous When such action becomes necessary, a messenger is sent to the leader of the platoon concerned with detailed information of the maneuver.

(*c*) *Assisting an adjacent platoon.*—The best way for a platoon to assist an adjacent platoon which has been held up is to push forward. When abreast the flank of the hostile resistance, conditions will determine whether the platoon should continue its advance or attack the flank of the hostile combat group which is holding up the friendly platoon.

The assault.—(*a*) Description.—The assault is the final phase of the attack to dislodge the enemy from his position with the bayonet or threat of the bayonet.

(*b*) *When delivered.*—The assault is delivered at the earliest possible moment that promises success. This usually occurs when hostile fire has materially decreased and become less effective (see Figs. 56-6 and 56-7).

Reorganization.—As soon as a position has been taken, the platoon will be reorganized. To do this, the platoon leader will

(1) Provide for the protection of the platoon (send scouts or several small groups to the front and flanks).

(2) Regain control of his squads.

(3) Appoint acting petty officers as necessary to replace casualties.

(4) Reorganize squads, if necessary (this may mean a reduction in the number of squads).

(5) Have ammunition redistributed (including that removed from casualties).

(6) Have prisoners sent to the rear.

The pursuit.—(*a*) When ordered in direct pursuit, the platoon continues to fire on the enemy as long as he is in sight, then reorganizes if necessary, and advances rapidly to regain contact. The platoon must guard against getting so far ahead of the general line as to be in danger of isolation.

(*b*) Pursuing forces must at all times be prepared for a counter-attack by the enemy. Normally, the enemy will direct such counter-attacks against the flanks of the pursuing force as they are particularly vulnerable. When necessary, flank guards should be thrown out to afford protection against such enemy action.

The platoon in defense.—(*a*) A platoon sector (area) is organized for defense by establishing the platoon in it as one combat group or dividing the platoon into two or three combat groups, each separated by 50 to 150 yards. Normally, it is desirable to place one combat group in support in rear of the firing line. The size and location of the groups will be considerably influenced by the availability of machine-gun support and whether or not the platoon sector is in the open, or in the streets or buildings of a city.

(*b*) The platoon leader assigns a defense position to each group from which it has a clear field to fire to its front and flanks and, if practicable, the front and flanks of groups on its right and left.

(*c*) When the defense positions have been indicated, the combat groups are ordered to construct the defenses.

(*d*) *Positions for automatic rifles.*—Automatic rifles are placed so as to cover the front and flanks of the platoon area. The best locations are on the flanks so as to provide for oblique fire without being visible from the front. The automatic rifles should also be able and ready to fire to the front, flanks, and rear of adjacent groups.

(*e*) *Obstacles.*—The best type of hastily constructed obstacle is a concealed wire entanglement on the front and flanks, placed at a distance beyond hand-grenade range (about 50 yards). Obstacles are so placed

that the ground in front of them may be enfiladed by automatic rifle and machine-gun fire.

(*f*) *The counterattack.*—Plans and instructions for counterattack are made and given by the company commander and platoon leaders. If the enemy penetrates the position, the support platoon of the company and the support squads (groups) of the platoons attack at once, preferably from the flank, and without orders. Troops which have just captured a position are disorganized, and may be driven out by a quick rush with the bayonet, even though the enemy is in superior numbers. Supports play the most important role in successful counterattacks.

The support platoon in attack.—(*a*) Normally, when a company with 3-platoon organization is distributed in depth for an attack, one platoon, called the support platoon, is held out as the company support.

(*b*) The leader of a support platoon is usually informed of the distance his unit is to follow the assault echelon (the assault platoons). This will vary from 100 to 200 yards. These limits provide the normal variations of distance depending on conditions, but are not to be followed blindly.

(*c*) The leader of the support platoon maintains contact with the assault platoons. He usually employs messengers or scouts for this purpose.

(*d*) The support platoon leader is responsible at all times for protection of his flanks.

(*e*) The support platoon is the maneuver element of the company. The most usual missions which will be given it are:

(1) To re-enforce the assault echelon (the assault platoons).
(2) To occupy gaps in the line.
(3) To provide security for the flanks of the assault platoons.
(4) To assist adjacent units which are held up.
(5) To cover the reorganization of the assault echelon.
(6) To relieve a platoon of the assault echelon.
(7) To mop up a captured position.

(*f*) Except under most unusual circumstances, such as a surprise attack on the flank of the assault echelon, the support platoon is held in readiness for orders from the company commander.

(*g*) The platoon leader acts without orders when confronted with an unforeseen situation requiring immediate action. In so doing, he assumes full responsibility.

The support platoon in defense.—When on the defensive, a company with a 3-platoon organization may place two of its platoons in

the firing line and hold out one as company support. This support platoon is placed in a position in rear of the platoons in the firing line. In general, the support platoon assists the platoons in the firing line as prescribed for a support platoon in the attack. It is particularly effective for making counterattacks.

Mopping up.—(*a*) To mop up or clean up means to put out of action any of the enemy left in the buildings of a town or in an entrenched position which has been or is being taken. Those who surrender are taken as prisoners, those who resist are shot.

(*b*) A platoon assigned the mopping-up mission generally will be ordered to follow the unit which is to capture a defended position, thus enabling the assault unit to continue the advance promptly without halting to mop up.

(*c*) While mopping up, members of a squad enter a trench, shelter, or building only to clean it out or to take cover when forced to do so by enemy fire.

(*d*) All buildings, shelters, observation posts, and other possible hiding places for the enemy must be thoroughly cleaned out.

(*e*) Members of a platoon assigned as moppers up are not permitted to go beyond the position to be mopped up nor to mingle with attacking troops.

(*f*) Units on this duty must work rapidly in order that the entire platoon may quickly be made available for further service.

Connecting group.—(*a*) Platoons must maintain contact with adjacent platoons. This is done by sending a connecting group to maintain contact with the platoon concerned or by detailing one man, usually a scout or messenger, to observe to the flank concerned. A connecting group between two platoons usually consists of a 2-man patrol.

(*b*) The connecting group should operate so that it knows at all times the location of its own unit and the adjacent unit with which it is required to keep in contact. It does not fight except in self-defense or to give warning of a flank attack.

(*c*) Should contact with the adjacent unit be lost, the connecting group will immediately notify the commander of the unit to which it belongs and, unless otherwise directed, remain out as a flank combat patrol.

COMBAT SIGNALS

Purpose.—Combat signals are used for transmitting commands in a simpler, more direct, and more efficient manner than would be possible by the use of the voice.

Kinds of signals employed.—Combat signals may be made by whistle and by motions of the arm and hand, as prescribed herein.

General instructions for making arm-and-hand signals.—(*a*) When possible, signals will begin with the hand at the side and will be completed by its return to that position.

(*b*) If any movement is to be executed by an element of a command, the first part of the signal designates the element and is followed by the signal for the movement (see signal for squad column).

(*c*) Whenever practicable, a second signal should not be given before the first one has been executed.

Whistle signals.—(*a*) *Attention to orders.*—(1) Sound a short blast of the whistle. This signal is used to fix the attention of troops or of their commanders and leaders, preparatory to giving commands, orders, or signals.

(2) At the short blast of a whistle, squad leaders in charge of portions of the firing line will fix their attention upon their leader. If the signal was given by the commander of some other unit or if no orders or commands are given by their own leader, they will at once return full attention to their own squad or group.

(*b*) *Cease firing.*—Sound a long blast of the whistle. This signal will be confirmed at once by an arm-and-hand signal (cease firing) or by other means.

(*c*) *Air or tank warning.*—Sound 3 long blasts, and repeat several times.

(*d*) *Limitation of whistle signals.*—Whistle signals other than those stated above are prohibited.

Arm-and-hand signals. (*a*) *Forward; By the right (left) flank; To the rear.*—Face and move in the desired direction of march; at the same time extend the hand vertically to the full extent of the arm, palm to the front, and lower the arm and hand in the direction of movement until horizontal.

(*b*) *Halt.*—Carry the hand to the shoulder, palm to the front; then thrust the hand upward vertically to the full extent of the arm and hold it in that position until the signal is understood.

(*c*) *Lie down;* or, *Take cover.*—Turn toward the unit or group and raise the hand, palm down, in front of the elbow, forearm horizontal; thrust the hand downward and back to this position several times, holding the wrist rigid.

(*d*) *Double time;* or, *Rush.*—Carry the hand to the shoulder, fist closed; thrust the fist upward vertically to the full extent of the arm

and back to the shoulder and repeat the movement rapidly several times.

(*e*) *As skirmishers.*—Raise both arms laterally until horizontal, arms and hands extended, palms down. If it is necessary to indicate direction of march, signal *Forward,* moving at the same time in the desired direction.

(*f*) *Assemble.*—Raise the hand vertically to the full extent of the arm, fingers extended and joined, and describe large horizontal circle with the arm and hand.

(*g*) *I am ready.*—Extend the arm toward the leader for whom the signal is intended, hand raised, fingers extended and joined, palm toward the leader.

(*h*) *Commence firing.*—Extend the arm and hand horizontally in front of the body to their full extent, palm of the hand down; move them several times through a wide horizontal arc.

(*i*) *Cease firing.*—Raise the forearm in front of the forehead, palm to the front, and swing it up and down several times in front of the face. Accompany this with the whistle signal.

(*j*) *Squad.*—Extend the hand and arm toward the squad leader, palm of the hand down; distinctly move the hand up and down several times, from the wrist, holding the arm steady.

(*k*) *Squad column.*—Execute the signal for *Squad:* drop the arm and hand to the side and immediately swing them, extended, in a pendulum movement straight to front, not higher than the shoulder, and back again to the side.

(*l*) *Leaders join me.*—Extend an arm toward the leaders and beckon the leaders to you.

(*m*) *Fix bayonet.*—Simulate the movement of the right hand in executing fix bayonet.

(*n*) *Enemy in sight.*—Hold the weapon horizontally above the head with the arm or arms extended as if guarding the head.

(*o*) *Quick time (walk).*—Raise the elbow to a position above and to the right (left) of the shoulder and extend the forearm to the left (right), hand above the head, palm to the front. This signal is also used to decrease gait or speed.

(*p*) *Change direction.*—Carry the hand that is on the side toward the new direction across the body to the opposite shoulder and, with the palm down and the forearm horizontal swing the forearm in a horizontal plane, extending the arm and hand to point in the new direction.

(*q*) *As skirmishers, right (left).*—Raise both arms laterally until

horizontal, arms and hands extended, palms down; swing the arm and hand on the side toward which the deployment is to be made, upward until vertical and back immediately to the horizontal position; repeat swinging movement several times; hold the other arm and hand steadily in the horizontal position until the signal is completed.

(*r*) *Are you ready.*—Execute the signal *I am ready.*

(*s*) *Fire faster.*—Execute rapidly the signal *Commence firing.* For machine guns, a change to the next higher rate of fire is required.

(*t*) *Fire slower.*—Execute slowly the signal *Commence firing.* For machine guns, a change to the next lower rate of fire is required.

PART SEVEN

MISCELLANEOUS

CHAPTER 57

MISCELLANEOUS

Submarine service 731
Naval Reserve 732
Navy training courses 736
Duties of a petty officer 738
Disposition of effects of deserters, deceased men, and men going on leave... 742

SUBMARINE SERVICE

THE modern type submarines, which are now named after fishes, are about 310 feet in length, displace 1,500 tons when on the surface, and carry a crew of 5 officers and 55 men. They are equipped with torpedo tubes in both the bow and stern, and mount a 3-inch gun which may be used against either surface targets or aircraft. Their maximum speed on the surface is about 21 knots, using Diesel engine-electric drive, and about 8 knots submerged, using storage batteries and motors.

They are attached to certain units of the fleet, and also operate from submarine bases located at Coco Solo, C.Z., and Pearl Harbor, T.H.

For training the men in this service there is a submarine school at New London, Conn., which offers special instruction in submarines, including courses in Diesel engines, radio, electricity, and sound.

Enlisted men assigned to duty aboard submarines receive pay in addition to the pay and allowances of their rating and service as follows:

(*a*) When regularly attached to submarines in commission based at shore submarine bases:

(1) Unqualified men, $5.00 per month.

(2) Qualified men, $20.00 per month.

(3) Chief petty officers and petty officers, first class, after one year from date of qualification, $25.00 per month.

(*b*) When regularly attached to submarines in commission, not based at shore submarine bases and when attached to submarines under construction for the Navy from the time the builder's trials commence:

(1) Unqualified men, $10.00 per month.

(2) Qualified men, $25.00 per month.

(3) Chief petty officers and petty officers, first class, after one year from date of qualification, $30.00 per month.

To qualify as a submarine man, certain requirements must be ful-

filled. He must have served at least six months on submarines. Before presenting himself for examination, the candidate must submit a notebook. This book must contain all data specified by "Submarine Instructions." The examination is an oral and practical one. It consists in going through the boat and operating all apparatus in the boat and answering any questions pertaining to the same. A commissioned officer conducts the examination.

On a submarine a wonderful opportunity is offered for getting much practical knowledge of electricity, particularly in regard to storage batteries. These batteries are the largest of their kind found anywhere today. Nearly all apparatus are electrically operated, including the main motors for under-water propulsion, steering and diving rudders, gyrocompass, pumps, galley range, and anchor gear. A submarine also is the best place in the Navy for obtaining valuable experience with Diesel engines, which are used for its motive power on the surface. This type of internal-combustion engine is becoming prevalent in the merchant marine service and in many of our shore radio stations.

THE NAVAL RESERVE

The Bureau of Navigation takes this opportunity to call the attention of the service in general to the provisions of the naval reserve act, which became effective July 1, 1938, and also to the "Naval Reserve Regulations" promulgated thereunder by the Department, which may be found in all ships' libraries as Part H, *Bureau of Navigation Manual.*

It is hoped that under the provisions of this act the sea power of the United States may be materially increased, since officers and men who leave the service under honorable conditions and who still desire to retain some connections therewith may do so by joining the Reserve in the particular capacity for which they are qualified, and in so doing the experience which they have gained and the loyalty which they have given to the service will be continued and not lost to the country.

The training duty required of reservists in order to maintain efficiency should serve to keep alive that love of the sea and the sea life which caused the individual to enter the regular or reserve service.

The Naval Reserve is composed of four principal branches, *viz.,* the Fleet Reserve, the Organized Reserve, the Volunteer Reserve, and the Merchant Marine Reserve. These may be broadly summarized as follows:

The Fleet Reserve.—The purpose of the Fleet Reserve is to provide an available reserve of former officers and former enlisted men of the

regular Navy whose services may be utilized without further training to fill those billets requiring experienced personnel in the initial stages of mobilization. The several sub-divisions of the Fleet Reserve will be discussed later.

The Organized Reserve consists of officers and men who are required to perform a specified amount of training annually, and who are available for immediate mobilization. The Organized Reserve is designed to furnish crews upon mobilization for certain combatant ships (largely of the destroyer type) or auxiliaries of the Navy. The Organized Reserve is ordinarily divided into units, the division of about 100 men being the unit for the surface component, and the squadron being the unit of the aviation component. There are Organized Reserve units with headquarters at armories or aviation bases located in almost 100 cities throughout the country.

The Volunteer Reserve consists of those officers and men who are available for service (either general or specialized) but who, in the main, are not attached to other branches of the Naval Reserve. The members of the Naval Communication Reserve fall into this category.

The Merchant Marine Reserve is composed of officers and men who follow the sea as a profession and should be of the utmost value as an adjunct to the national defense in time of war.

The Bureau notes that many former officers and men of the regular service have, from time to time, gone into the Merchant Marine, and the Bureau is particularly proud of the fact that many former enlisted men of both deck and engine-room ratings have not only passed the professional examinations required by the Department of Commerce for licensed officers, but that many now hold very responsible executive and administrative positions in the Merchant Marine. It is thought that future developments may open up possibilities of a career in the Merchant Marine Reserve to the enlisted man of the Navy who is ambitious to study and improve himself professionally.

There is a very vital principle in connection with the Naval Reserve which should be always borne in mind and which is strongly evidenced by the maritime policies of various world powers, namely, it should be the aim to strengthen our Navy so far as possible by means which least tend to stimulate rivalry in the maintenance of armaments. A force in reserve does not provoke to retaliatory measures in any great degree.

Every officer and man of the regular service should bear in mind the possibility of being called upon to serve either in or with the Reserve, and he is therefore to co-operate and aid in every possible way in pro-

moting the efficiency of the Reserve; since with every shrinkage which may be brought about by international reduction in the regularly established services of defense, the function of the trained reserve is being correspondingly increased in importance.

The Fleet Reserve.—For the ready information of the service there is given herewith the various classifications of men which comprise the Fleet Reserve:

(*a*) *Class F-2.*—Those who are transferred direct from the Navy thereto after 4 or more years' naval service and those, who after an equal amount of such naval service, have been honorably discharged and are enlisted in the Naval Reserve and assigned to this class.

(*b*) *Class F-3c.*—Those men who previous to July 1, 1925, were transferred from the regular Navy to the Naval Reserve Force after 16 years' naval service, and on July 1, 1925, were further transferred from the Naval Reserve Force to the Naval Reserve.

(*c*) *Class F-3d.*—Those men who previous to July 1, 1925, were transferred from the regular Navy to the Naval Reserve Force after 20 years' naval service, and on July 1, 1925, were further transferred from the Naval Reserve Force to the Naval Reserve.

(*d*) *Class F-4c.*—Those men who served in the regular Navy prior to July 1, 1925, who were either in the Navy or Naval Reserve Force on that date and thereafter transfer to the Naval Reserve after 16 years' naval service.

(*e*) *Class F-4d.*—Those men who served in the regular Navy prior to July 1, 1925, who were either in the Navy or Naval Reserve Force on that date and thereafter transfer to the Naval Reserve after 20 years' naval service.

(*f*) *Class F-5.*—Those men who first enlist in the Navy after July 1, 1925, or who re-enlist with broken service after that date and transfer to the Naval Reserve after 20 years' naval service.

There are two ways in which enlisted men may enter the Naval Reserve:

(1) By enlistment in the Naval Reserve.

(2) By transfer to the Fleet Reserve.

Former enlisted men of the regular Navy may be enlisted in Class F-2 of the Fleet Reserve if such men have been separated from the regular Navy less than 4 years and if such men have been honorably discharged therefrom and recommended for re-enlistment after not less than 4 years' service therein. For this purpose, any enlistment

terminated within 3 months prior to the expiration of the term of such enlistment is counted as the full term of service for which enlisted.

The only obligation imposed on members of Class F-2 is to keep the District Commandant informed of their correct address and physical condition and to hold themselves subject to active service in time of war or when in the opinion of the President a national emergency exists. For these obligations, the Navy will pay $20 a year. They need not attend drills, nor will they be required to perform any duty that might interfere with their peace-time civil occupation. Enlistments in Class F-2 may be made only by Navy Recruiting Officers and it is requested that you visit your nearest Recruiting Office for further information.

Those who enlist in the Organized Reserve and are attached to divisions receive one day's pay of their rating for the performance of each drill or period of equivalent instruction or duty. They may not, however, be enlisted in the Organized Reserve unless there are vacancies for them in the organizations to which they are to be attached, and also subject to the approval of the commanding officers of such organizations.

Enlisted men who enlist in the Naval Reserve within three months of discharge from the Navy keep their continuous service rights with the exception that, if they re-enlist in the Navy after three months from their discharge, they will be re-enlisted in the rating held at time of discharge only if vacancies exist in that rating and if such ratings are open to broken-service men at the time of their re-enlistment.

Enlisted men serving in the Navy on July 1, 1925, or who re-enlist with continuous service after that date may be transferred to the Fleet Reserve, Class F-4c, after 16 years' and to Class F-4d after 20 years' naval service. They make application to the Bureau of Navigation through their commanding officer for such transfers to the Fleet Reserve.

The following are examples of the monthly pay received by such men:

Rating	F-4c 16 years	F-4d 20 years
Seaman, first class	$31.30	$ 44.35
Petty officer, first class	48.80	69.10
Chief petty officer (PA)	73.30	103.75

Enlisted men who were not serving in the Navy on July 1, 1925, and who re-enlist with broken service or who enlist for the first time

after July 1, 1925, may be transferred to the Fleet Reserve, class F–5, on their own application, only after 20 years' naval service. Such men of the ratings indicated receive monthly pay as follows:

Rating	F-5
Seaman, first class	$26.80
Petty officer, first class	41.80
Chief petty officer (PA)	62.80

Enlisted men who were transferred to the Fleet Reserve after 16 to 20 years' naval service may be retired after 30 years' service. All naval service counted for transfer to the Fleet Reserve and all time in the Fleet Reserve after transfer is counted for retirement.

Fleet reservists on the retired list after 30 years' service receive monthly pay as follows:

Rating	F-4c Retired[1]	F-4d Retired	F-5 Retired
Seaman, first class	$47.05	$ 60.10	$ 56.05
Petty officer, first class	64.55	84.85	78.55
Chief petty officer (PA)	89.05	119.50	110.05

[1] Rates presuppose more than 16 years' service for pay purposes at the time of transfer but do not include credit for extraordinary heroism in the line of duty.

Note.—The hospital fund of $0.20 per month has been deducted from all of the above rates of pay.

NAVY TRAINING COURSES

To assist enlisted men in advancing themselves in rating, or in learning a trade, and to improve their general education, the Bureau of Navigation issues training courses for all ratings except certain artificer ratings such as carpenter's mates, shipfitters, painters, and metalsmiths. The technical material for these ratings is incorporated in the *Naval Artificer's Manual,* by Pate.

The courses are of three kinds: (*a*) Rating courses, (*b*) General courses, and (*c*) General training courses for petty officers.

These courses are issued without charge to any enlisted man who requests them. Study is carried on under the direction of officers and petty officers of all ships and naval stations, and necessary assistance is given to the men taking the courses.

In developing the Navy training courses, the Bureau of Navigation has endeavored to meet the most important needs of enlisted men. The type is large in order that men using the courses will not strain their eyes when studying them under conditions of lighting usually prevailing

in a ship. The subject matter is well arranged. Three progress tests and examinations pamphlets are issued automatically with each course. This provides for the use of each training course by at least three men. Therefore, when a man has completed his course, it should be turned in to the division officer or to the educational officer for re-issue. A copy of each course is kept in the ship's library for reference work.

These courses are prepared by officers long experienced in the Navy. They relate directly to naval subjects and are better for naval use than any textbook that can be purchased commercially. These courses contain subject matter which is taught in the best technical schools, and the man who is willing to supplement the experience gained in his daily work by systematic study along the same line usually succeeds.

Rating Courses.—In nearly all cases it may be assumed that the subjects covered by a rating course fulfill the requirements for the rating as given in the Bureau of Navigation Manual. The course brings together in compact and convenient form the information that will enable a man to meet the requirements, and no other study that an enlisted man can do will bear so directly upon his efficiency and success in the service as a thorough study of the course issued for a rating for which he is preparing himself.

To obtain any benefit from these courses, it is necessary that a regular system of study be carried out. A half hour, or an hour a day in a quiet place is sufficient time if the mind is kept on the subject and there is a determination "to dig at it." If a lesson cannot be understood, a consultation with some other man taking the same course or a chief petty officer or an officer should be held at some convenient time. In a short time this study will become interesting, and the more one works the better it will be liked.

General Courses.—These courses cover such subjects as:

A to N	Gyroscopic Compasses
Diesel Engines	Typewriting Manual
Gregg Shorthand Manual	Welder's Manual
Gregg Progressive Exercises	Artificer's Manual

Each general course now supplied by the Bureau of Navigation is closely related to the work in some branch of the service, and is intended to promote the efficiency and advancement of men in some naval rating.

General training courses for petty officers.—These courses are issued for petty officers and give the general qualifications required of all petty officers in addition to the knowledge required in their specialty.

These courses are written with the idea in mind that a petty officer must be first a leader and second a specialist.

Those courses classified as "Restricted—for Official Use Only" must be handled according to the regulations pertaining to restricted matter. Even though it appears that some of the subject matter should not be restricted, these courses indicate the degree of proficiency and scope of knowledge required of men in the various ratings, and this is the reason that these courses have been given a restricted classification.

THE DUTIES OF A PETTY OFFICER

The rating badge of a petty officer includes not only the specialty mark of a particular rating but also the insignia of all petty officers, the eagle and chevrons. The specialty mark stands for proficiency in a certain line of work. The petty officer insignia stands for the military duties, the authority, and the responsibilities which are such important parts of every petty officer's rating.

As a specialist, you will be called upon to do the work of your rating in an efficient manner. As a petty officer, you are the direct representative of the commanding officer of your ship or station, and will be called upon to carry out his orders faithfully and fully. Consequently, there is an added responsibility given to you when you are rated a third-class petty officer, and you must understand and accept these responsibilities. You have started to climb the ladder which leads to success. You will have new duties and responsibilities, but you will be given also added authority and privileges.

This article is written to make very plain to you the duties you will have in common with all other petty officers, duties which are military in character and which all petty officers must know.

When you are given a petty officer's rating, you must realize that your position has been radically changed. As a nonrated man you were expected to carry out orders and do such work as you were given to perform. As a rated man, however, you will be expected and required not only to carry out orders given to you by proper authority but also to issue orders to nonrated men and to supervise their work. With each promotion the proportion of supervisory duty becomes greater. Hence you must understand some of the qualities which must accompany this exercise of authority.

As a petty officer you must always remember that this rating carries with it the necessity of showing in yourself a good example of subordi-

nation, loyalty, courage, energy, sobriety, neatness, and attention to duty.

Nonrated men will not keep their clothing neat if you appear before them habitually slouchy, dirty, or unkempt.

The orders given by you will not be obeyed willingly and promptly, if you are at all insubordinate to other petty officers of higher rating or to commissioned officers.

Work will not go on energetically in a division or part of the ship, if you are not "on the job" so far as your own duties are concerned, particularly if you are forever trying to do as little as is necessary to "get by." There is no more damning fact in a petty officer's unwritten record than a reputation for doing his work just well enough to "get by" with it.

The successful petty officer always remembers that he is a leader of his squad, whether it is large or small, and that to get good work done he himself must do good work.

The necessity for setting a good example applies not only to conduct and actions on board ship but also to liberty ashore. An offense committed by you as a petty officer ashore or afloat is much more serious than the same offense committed by a nonrated man. As a petty officer you can often prevent others from unseemly conduct when on shore by your good advice and counsel.

Loyalty.—The first requirement of all petty officers is *loyalty*. Loyalty includes obedience. It has truthfully been said that of all the many qualities that a petty officer must possess, none is so important as loyalty. Loyalty just means a true, willing, and unfailing devotion to a cause. To you as a loyal petty officer, orders are orders and as such are to be obeyed regardless of your opinion as a petty officer as to their wisdom. Even though you happen to disapprove these orders, it is your duty and your job either to carry out your orders yourself or to transmit them to your men just as heartily and earnestly as though you fully approved of them. Do not criticize. Any criticism of yours will affect your division, the ship's spirit, and the opinion and respect of the men under you. The final test of loyalty is this: Can you be a leader by your cheerful and unfailing obedience to all orders regardless of how you feel about them? As a petty officer, if you do not do this, you fail as a petty officer; you are disloyal to both your officers and your men; and sooner or later you will lose their respect.

Justice.—The second requirement is *justice*. Justice does not mean severity or bullying. It means simply that all men under you should be

treated fairly. That no favorites should be played. That unnecessary and foolish orders will not be given simply to show your authority. That a chance to carry out an order will be given before the demand is made that the work connected with the order be finished.

Initiative.—A third requirement is *initiative*. Initiative means that you are able to do your own thinking. You must be able to act without supervision after you have been given an order to do something. You must be able to foresee the need of doing a thing without having your attention called to it. And this applies not only to your own department of the ship but to the whole ship. You may be a radio man or a carpenter's mate, but if you see the gripes on the lifeboat slack and see the boat swinging at the davits, your initiative, your duty as a petty officer requires you to call the attention of the boatswain's mate of the division to that condition in order that it may be corrected without delay. This means that you must cultivate judgment and that you must know the technical side of your rating.

Other requirements are *simplicity, self-control, tact, enthusiasm, reliability, honor, and truthfulness*. Be yourself; be human. Do not assume a high and mighty attitude just because you have a "crow" on your arm. Be calm. Never lose your head. Be patient. Remember that you do not have to yell at a man when you give him an order; the louder you shout, the less you are respected. Make sure your orders are understood and be patient with the man who is slow to interpret them. Be gentlemanly in all your actions. It has been said that a gentleman is "a man who is never intentionally offensive to others." This applies to your relations with your officers and the men under you.

Be tactful.—Study the personal traits of your officers and your men. Imitate the successful ones. Put some enthusiasm into your duties. Be energetic. Unless you are interested in your work, unless you feel that you are an important member of the ship's company, you cannot succeed.

Stick to your job, no matter how hard it is. Be reliable. Be trustworthy. Get the reputation of carrying out orders to the last detail, of never failing to accomplish what you set out to do. Be sincere in all your efforts to do everything well.

Be honorable and truthful.—The words "honor and truthfulness" cannot be qualified. There are no "ifs" and "buts" connected with them. A petty officer who is not honorable and truthful can never succeed, no matter what other qualifications he may have.

Know your job.—You cannot expect the men under you to know

how things should be done if you yourself cannot do them correctly and tell them how to do them. As soon as you know your own job, study the job next ahead of you. You may be called upon to handle it at any time without advance notice. It is unfair to the men under you to be forced to bear the consequences of either your own ignorance or carelessness. If you cannot get results, study yourself. The fault may be there.

Point out the defects which you notice and administer reproofs personally. When you see a man doing his work well, commend him at once, help him along. If you see some one doing his work badly or carelessly, censure him fairly and personally. Do not bawl him out to the whole world. Listen to helpful suggestions from your men. You will get many helpful ideas from them. Assign the work to your men in accordance with their personal abilities. Do not take out personal grudges on your men; it will not work.

Remember that the commissioned officers, especially those who are in closest contact with you, know you better than you realize. You cannot bluff; you cannot fool them all the time, even though you may do so occasionally. They know your ability to do the work that you are supposed to do.

These are the qualities which govern your advancement. Study yourself. Are you really hitting the ball? Do you measure up to the standard set by the successful officers and leading petty officers on your own ship? Are you better than the average in the Navy? If you are, you are on the road to success. If you are not, you will remain a third-class petty officer as long as you remain in the Navy.

Cultivate the habit of study and of outside reading. You can always make time for these. Your ship or station library has many good books which you should read. Do not be content to stay "in a rut." Pull yourself out by your own efforts.

Keep yourself fit physically.—You cannot expect to do your best work if you are not in the best physical condition.

Shore patrol.—You are a petty officer because your officers have confidence in your ability to perform military duties. Regardless of your specialty, it is probable that one of the first military duties you will be required to perform will be shore patrol.

Perhaps the establishment of the shore patrol has done more than any other one institution to make petty officers realize their duty as a class. As a rule, irrespective of specialty, they have all worked together in insuring the proper conduct of liberty parties and winning respect for the

uniform on shore in foreign and home ports. It is most important that a candidate for examination as petty officer thoroughly understand the details of this duty.

The following facts should be known by all petty officers of the shore patrol:

(*a*) The shore patrol is the force landed from naval vessels to maintain order among liberty men.

(*b*) It is usually composed of petty officers from each ship, under the command of officers.

(*c*) The members of the shore patrol must become acquainted and familiar with each other by sight, name, and rating, so that they may work together efficiently.

(*d*) They must study the local situation so that they may know how to carry out intelligently the orders of the patrol officer.

(*e*) They must bear in mind that the seriousness of indulging in intoxicating liquor while on duty is such that it is an offense which is punishable by general court-martial.

(*f*) In each situation they must know when to arrest a man and what to do with him after they arrest him. When a man is making a disturbance, the usual procedure is to arrest him at once. If you are unable to get him to the headquarters of the patrol (usually a police station of the town), call for assistance from one of the patrols near by. Patrols usually work in pairs or, if this is not possible, they keep in touch with each other in order to give quick assistance in case of trouble. In the event of an emergency, pick good men out of the crowd and tell them they are on duty to assist you in relieving the condition.

DISPOSITION OF EFFECTS OF DESERTERS, DECEASED MEN, AND MEN GOING ON LEAVE

Deserters' effects.—The officer of the division to which the man belonged inventories the effects and turns them over to the master-at-arms. After this inventory, the master-at-arms sees that each article is stamped indelibly and legibly with the letters "D. C." The articles will then be sealed and turned over to the supply officer.

It is customary for the disbursing officer to sell deserters' effects at auction to the highest bidder. This is usually done on the day the man is declared a deserter.

The master-at-arms and a responsible person attached to the supply division are required to be present at this sale.

The name of every man who buys an article of deserters' effects, the

name of the article, together with the price paid, should be recorded and kept in the records of the pay officer.

The master-at-arms also should keep a permanent record of the names of purchasers and the names of the articles purchased.

No man may buy articles that do not form a part of his uniform. A marine cannot buy naval clothing, nor can any man of the Navy buy marine clothing.

Effects of deceased men.—The master-at-arms shall take charge of the effects of deceased men. The officer of the division to which the man belonged will then inventory and seal such effects. They will then be turned over to the supply officer for safe-keeping until such time as they are disposed of as directed by the executive officer in accordance with the *Navy Regulations*. Perishable articles will be disposed of as directed.

Effects of men going on leave.—The master-at-arms shall receive the effects of men going on any extended leave, and shall be responsible for their safe-keeping.

CHAPTER 58

GAS-PROTECTIVE APPARATUS

War-time gas attack 744
Gas-mask drills 751
Upkeep of gas masks 760
Gases encountered in peace-time operations 763
Asphyxia 767
Artificial respiration 768
Protective apparatus 770
Gas masks for submarines 771

THE WAR-TIME GAS ATTACK

Forms of the attack.—Gas attacks in time of war may occur in various forms and be projected by many different methods and craft. Among these are two which are most likely to be met and provided against:

(1) *Gas-cloud attacks.*—In this form the attack is passive, as the noxious gases or toxic smokes are without kinetic energy and resemble a low-lying fog or hazy mist; some are even invisible. These may be generated over areas through which a fleet may be expected to pass in action and may be encountered in conjunction with smoke screens. As at present conceived, smoke screens can be laid by one of four methods:

(*a*) Smoke boxes.

(*b*) Smoke funnels.

(*c*) Smoke bombs dropped from aircraft.

(*d*) Funnel gases from steaming ships.

(2) *Shell, bomb, or mine attack.*—In this form of attack the contained gas, usually in liquid or in solid form, is projected with great velocity when the shell, bomb, or mine is burst. Thereafter the gas may be spread by gravity or drafts of air through voice tubing and drawn down into the various compartments of the vessel through the ventilation system. Adjacent compartments and those below the level of the one in which the explosion is effected will in all probability be rendered dangerous from the spread and settling of the gas.

Kinds of gases.—The gases used in modern warfare which may be encountered in future naval engagements are extremely dangerous. This is due to the insidious, poisonous, extremely irritating, and burning

effects of even small quantities of gas. Even an extremely small amount of certain gases will cause a casualty if breathed for a sufficient length of time. The fact that some of these gases do not make their action felt immediately makes them all the more dangerous. Their full effects may be delayed for several hours.

Nonpersistent gases are substances that are gases under ordinary atmospheric conditions and form gas clouds immediately upon the bursting of a shell or bomb. Chlorine is a good example. Liquids that boil at a very low temperature and vaporize readily form nonpersistent gases. Phosgene is one of the most deadly gases used in warfare, but it is a liquid which boils at only 47° F., vaporizes readily, and will not remain on the exposed decks or upper works for more than a few minutes.

Persistent gases.—Some gases, such as mustard gas, are formed from liquids which boil at a very high temperature and vaporize very slowly. The liquid may soak into the seams of deck planking, collect in out-of-the-way corners and pockets, where it slowly vaporizes, and is a source of great danger long after an attack has been made. When such gases find their way into a compartment which is in any way warmed, they constitute a serious menace until the compartment is completely cleared.

Toxic smokes.—Some gases are dispersed in extremely fine, solid particles, like dust or smoke. The particles themselves are irritating and toxic and give off poisonous vapors very slowly. They may be used in shells containing in addition a large amount of high explosive. The gases commonly referred to as "d. a." (diphenylchlorasine) and "d. m." (diphenylaminochlorasine) belong to this class.

Physical effects of gases.—The effects of toxic gases vary with the nature of the gas, but most of them irritate the tissues with which they come in contact, particularly those of the breathing system. The seriousness of this irritation may vary from extreme discomfort of the nose and throat to injury of the lungs serious enough to cause death. Some, like *mustard gas,* produce serious burns upon the skin, particularly the tender and moist parts under the arms and around the scrotum. Some are extremely irritating to the eyes and may cause temporary blindness.

Containers for gases.—Gases are supplied to the Navy in re-enforced metal cylinders. Extreme care must be exercised in the handling and use of these gases because of the highly explosive quality of some of them under certain conditions. To avoid errors in use the Navy Depart-

ment has specified in the *Bureau of Construction and Repair Manual* exactly how these cylinders are to be painted in order to make identification easy. Figure 58-1 shows the colors with which the various gases

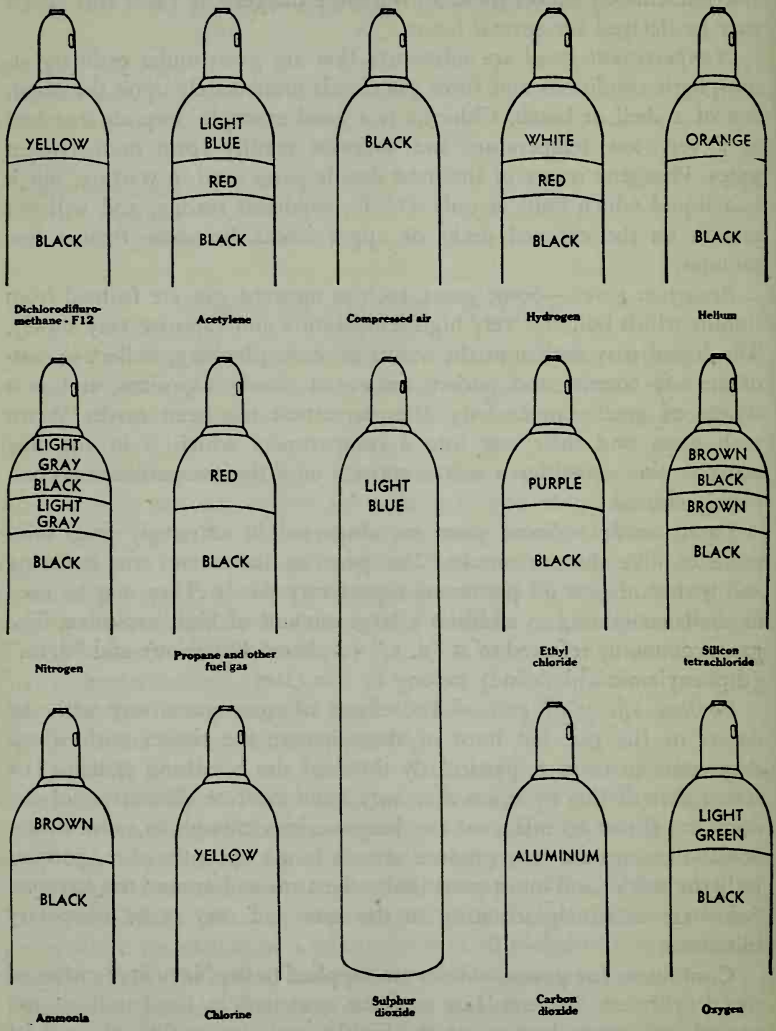


FIG. 58-1—Gas cylinders.

stowed in cylinders are identified. All men charged with the use of any of these gases should make themselves acquainted with these identification marks.

Collective protection against gas.—The term classifies all precautionary measures and apparatus used for protecting groups of men, compartments, fittings, etc.

Protection during action.—During action the main point to be considered is the *prevention of the spread of the gases throughout the vessel.* This is accomplished by

(1) Shutting down all ventilation systems not required for ventilating the fighting spaces of the ship and closing all dampers and all water-tight covers provided for the terminals of such systems.

(2) Close and keep sealed all compartments not required to be entered in action.

(3) Close all doors, hatches, and manholes and keep them closed at all times, except when absolutely necessary to pass through, and then test for gas before opening a compartment.

(4) At the first sound of a gas alarm, shut down the ventilation system and close the vent terminals with the water-tight covers already provided in all except engine-rooms and firerooms.

Precautions after action.—After action the main point is to clear out nonpersistent gases and smokes and to neutralize and clear out any persistent gases and toxic smokes which might be aboard. Special means for dissemination of nonpersistent gases and smokes in open spaces, such as fire-control tops, decks, bridges, etc., are not necessary. In semi-open spaces, such as turrets, firerooms, conning towers, torpedo rooms, etc., such gases and smoke should be disseminated by means of the ventilating system or other forced-draft systems to such spaces. The large volume of air required in the last-mentioned spaces precludes the use of purifiers. Closed spaces, such as central stations, plotting-rooms, etc., are now being fitted with air coolers and purifiers, so that these spaces can be completely closed air-tight against both persistent and nonpersistent gases and toxic smokes. In case nonpersistent gases do get in such spaces in shells or through bulkheads or by torpedo or mine, steps should be taken to confine the gas to as small a space as possible, which would be accomplished by the original precautions taken to conserve the integrity of the hull. If the damage is below the water line, the steps taken to confine the incoming sea water will also largely confine the chemical agents. Ordinarily the ventilating system can be again relied on to clear closed compartments of nonpersistent

gases and smokes, bearing in mind the danger to other compartments from exhausts that do not necessarily lead directly outside.

The neutralization and dissemination of persistent gases, which may be present in open spaces and which by the means mentioned above may gain entrance in the closed and semi-closed spaces, present problems the solution of which depends largely upon the nature of the chemical agent. This matter has been and is still being made the subject of extensive investigation. To date several possible means have been devised for meeting such situations. Upon completion of investigations and experiments now under way, the method found most suitable for accomplishing desired results will be adopted. Accordingly, the precautions which should be taken after engaging in action to rid the ship of any persistent gases and toxic smokes which may be present should be in accordance with the degassing instructions in effect at the time.

Further development in regard to collective protection may be expected. All men should learn what means are used in their battle stations for this kind of protection, as a *thorough knowledge of this is essential for their safety,* in case of gas attack, for individual protection.

Individual protection against gas.—This term defines the equipment issued for protection of the individual man against the effects of gas. Such protection is afforded at present both by *gas mask* and by *protective clothing.*

The gas mask is the most important article of equipment furnished for individual protection. The standard gas mask adopted for Navy use is known as the ND (Navy diaphragm) gas mask. The special feature that makes this mask different from other ordinary gas masks is that, in addition to furnishing the most efficient protection yet devised, it has a diaphragm incorporated in the angle tube assembly which allows the wearer to talk and be understood by others, thus making communication much more efficient than with previous types of masks. The ND masks consist of two types, *i.e.,* the ND and the NDO (Navy diaphragm optical) masks. The ND mask is issued to personnel in general. The NDO mask is issued to personnel using optical instruments, such as binoculars, range finders, directorscopes, etc. The ND mask is shown in Figs. 58-2, 58-3, and 58-4. The NDO mask is somewhat different in construction; the canister is not held in the satchel but is attached to the rear of the head harness and is held at the back of the head when worn. The NDO gas mask is still in the process of development, and the number of them which has been issued to the fleet has been limited to those required for experimental service tests. The com-

plete ND mask consists of the following principal parts: (1) face piece, (2) corrugated tube, (3) canister, (4) satchel or carrier, (5) antidim stick.

(1) The face piece is, as its name signifies, the part of the mask that covers the face. The fabric of the face piece is made from a special rubber compound covered with stockinet. Glass lenses in metal frames are inserted in the proper place to allow proper vision. The lenses in the NDO gas mask are of a special size, held apart at a certain distance by a metal nose bridge, and held at the proper focal distance from the eye to permit use with optical instruments. When worn the face piece of the ND gas mask is held in place by an elastic head harness which fits around the head. The inlet and outlet for air are in the angle tube, an aluminum casting inserted in the front of the mask. From the inlet opening the air is led up a short distance, the passage then branching into two elliptical tubes, called deflectors, whose openings, being inboard of the eyepieces, throw the incoming fresh, dry air directly against the inside surface of the eyepiece lenses in order to evaporate any moisture which condenses on them, and thus prevent fogging of the lenses. The outlet opening is to the left of the center line of the angle tube and is set at an angle. Attached to the outside of this opening is the outlet valve, called the flutter valve. The flutter valve is of rubber, slotted in such a way that, while it allows the exhaled air to pass out easily, it prevents any air being drawn into the mask upon inhalation. In front of the angle tube is a circular opening about 2¾ inches in diameter threaded to receive the perforated aluminum diaphragm disks, which are two in number, one being male and the other female. Between these aluminum disks the diaphragm is held tightly in place by friction.

For masks in service the face pieces of gas masks have been made in four sizes, as follows:

Size No. 1, very small.
Size No. 2, small.
Size No. 3, medium.
Size No. 4, large.

(2) The corrugated tube, or hose tube, is made of the same stockinet-covered rubber as the face piece, the corrugations being to prevent the tube from kinking, which would shut off the air. The corrugated tube connects the face piece to the canister, one end being made fast to the outer extremity of the inlet opening of the angle tube and the other to the nozzle of the canister.

The war canister (olive drab or blue) is a corrugated tin can about 10 by 5 by 2 inches, corrugated for strength, in the top of which are two inlet check valves and an outlet nozzle. The inside of the canister contains a special filter and a mixture of chemicals for filtering out smokes and neutralizing the various chemical war agents, respectively. The valves on the top of the can are protected by a tin rain shield. When the mask is worn, air is drawn first through the inlet check valves into the air space surrounding the filter; then it passes through the filter, through the absorbent mixture, and thence through the nozzle and hose tube to the face piece. The nozzle is protected by a wire screen, which prevents the fine particles of the absorbent mixture being drawn into the hose tube. All joints are made air-tight, so that if the masks are in perfect condition all air which enters the face piece must first pass through the filter and absorbent mixture. The action of the filter is purely mechanical. It removes all solid particles, such as smoke and toxic smoke. The action of the chemical mixture is partly mechanical and partly chemical, depending on the chemical agent which gets through the filter to it, *i.e.*, the chemical mixture may act as an absorbent or a neutralizer, depending on the nature of the gas.

(3) The life and effectiveness of the chemical contained in the canisters, while in store, is practically indefinite if proper care is exercised to keep the canisters free from moisture. When in use, their longevity is dependent upon the nature and concentration of the gas encountered and the total length of time of exposure. It is estimated that under continuous exposure to war gases in such concentrations as may be encountered on board naval vessels under war conditions the life of the present canisters can be depended upon to last at least 3 months.

(4) The satchel or carrier for the ND mask is a haversack-like canvas bag, which is carried close up under the left arm. It is made fast to the body by two adjustable web straps, one passing over the right shoulder and the other around the waist. The canister is held vertically in place in the rear of the satchel by two narrow straps, the upper of which has a buckle fastener, so that the canister can be removed. The forward space of the satchel is for storage of the hose tube and face piece when not in use. The satchel opens at the forward edge and may be closed by a flap, which is fastened with snap buttons. When the mask is worn, this flap may be fastened shut around the hose tube, thus helping to keep moisture and other injurious substances away from the canister.

(5) The antidim stick is a compound made in the form of soap and

rolled into sticks, which are placed with a small piece of cheesecloth in a small metal container which is carried in the gas-mask satchel or haversack. When rubbed in a thin transparent layer on the inner surfaces of the eyepieces, the compound prevents dimming and fogging of the eyepieces.

Protective clothing.—The gas mask when worn covers only the face. Consequently, the protection which it affords from poisonous gases, smokes, and fire is limited to the eyes, lungs, and that part of the face which it covers. Ordinary clothing affords no protection against fire and vesicant gases, *i.e.,* gases of the mustard type. To provide a full measure of protection against the conditions attendant on gas warfare, it is necessary that special clothing be worn to protect such parts of the body as are not protected by the gas mask. Ships will probably be provided with impermeable gas suits

The suits will be made in the form of cover-alls with hoods to cover such portions of the head and face as are not protected by the gas mask. The impermeable clothing is made of specially prepared fabric which affords protection against both liquid and gaseous mustard. These suits are impervious to both air and moisture. They permit no air to enter. Perspiration remains entirely within the suit, saturating the underclothes and gathering in the boots and in folds and pockets.

Since a man at rest gives off about 700 cu. cm. of water per day as perspiration and probably two or three times that amount under vigorous exercise, it is obvious that such suits are satisfactory only for short-time emergency use. Consequently, their issue, if made at all, will be limited to personnel forming "clean-up squads," who may be assigned to rid compartments which after combat may contain vesicant gases in liquid form.

GAS-MASK DRILLS

Drill A—To sling the mask.—1. *Sling,* 2. *MASK.* At the command *Sling,* grasp the metal hook above the snap fasteners with the left hand, at the same time grasping the metal clasp at the extremity of the shoulder sling with the right hand. Hold the mask waist high in front of the body with side containing snap fasteners next to the body. At the command *Mask,* extend the left arm sidewise to full length. At the same time pass the shoulder sling over the right shoulder with the right hand; then bring the two hands together across the chest and fasten the hook and clasp together. Adjust the satchel in its proper

position under the left arm. Pass the waist strap around the waist and fasten together in front (see Fig. 58-2).

FIG. 58-2—Gas-mask drill A—To sling the mask.

Drill B—By the numbers to obtain accurate adjustment of the face piece.—Proficiency in this drill will be followed by practice with-

out the numbers to insure as quick an adjustment as possible without sacrificing accuracy. Practice in holding the breath will also be included. The drill must be practiced until a complete and accurate adjustment can be made quickly by all (see Fig. 58-3).

FIG. 58-3—Gas-mask drill B—To obtain accurate adjustment of the face piece.

By the numbers, GAS. ONE. Stop breathing.—With left hand, open flap. At the same time hold right arm with forearm across the front

of the body; the forearm at right angles to the upper arm and at the same level as the opening of the satchel. Thrust the right hand into the satchel, grasping the face piece between the thumb and fingers just above the angle tube. *TWO.* Bring face piece smartly out of satchel to height of chin, holding it firmly in both hands, with the fingers extended and joining outside the face piece, the thumbs inside at the binding, midway between the two lower straps of the head harness. Thrust out the chin. *THREE.* Bring face piece forward, digging chin into it. With the same motion guide straps of the harness over the head with the thumbs, knocking off the hat, if worn, backward. *FOUR.* Feel

FIG. 58-4—Testing for presence of gas.

around the edge to make sure the face piece is well seated. See that head harness is correctly adjusted. *FIVE.* Close outlet valve by pinching between thumb and fingers of right hand to prevent the passage of air through it and blow vigorously into the mask, completely emptying the lungs. *SIX.* Pass flap of the satchel around the corrugated tube and fasten on the outer snap fastener. Replace hat.

FIG. 58-5—Removing mask from face.

Drill C—Method of testing for presence of gas.—Mask being adjusted: (1) *Test for gas.* Take a moderately full breath. Stoop down so as to bring the face close to the ground, but *do not kneel.* Insert two fingers of right hand under face piece at right cheek. Pull the face piece slightly away from right cheek and sniff gently. If gas is smelled, readjust the face piece. Close outlet valve by pinching between thumb and fingers of right hand and breathe out hard, thus clearing the face piece of gas (see Fig. 58-4).

Drill D—To remove the mask.—Having tested and found no gas: 1. *Remove,* 2. *MASK.* Insert the first two fingers of right hand under face piece at the chin with the thumb on the outlet-valve guard. Bend the head forward, at the same time removing the face piece with an upward motion of the right hand (see Fig. 58-5).

Drill E—To replace the mask.—1. *Replace,* 2. *MASK.* Grasp face piece in right hand, fold flat in one fold with edges of face piece turned

upward, the fingers under the left eyepiece and thumb under the right eyepiece. With the left hand, grasp the head harness, carry over and place the harness pad on the right eyepiece, and hold it in place with the thumb. Slide the corrugated tube into the bottom of the satchel until the angle tube has passed the satchel entrance, then turn the edges of the face piece toward the back of the satchel, and push the face piece into the upper empty part of the satchel above the corrugated tube.

Note.—After all drills the eyepiece should be rubbed with antidim, leaving a thin, transparent film of the composition on the glass; the face piece should be wiped dry, folded correctly, and put away in such manner that the outlet valve is not bent.

In addition to the above drills, conducted to give personnel proficiency in the use of the gas mask, periodic inspections are made to determine the material condition of gas masks to make any repairs indicated by these inspections. These inspections may take place in the form of mask-inspection drills; the procedure followed in conducting such drills is given below.

Drill F—Prepare for mask inspection.—The mask being in the slung position. 1. *Prepare for mask inspection,* 2. *Unsling,* 3. *MASK.* Open flap of satchel and take out complete mask, including canister. Hold satchel in left hand and canister in right hand.

Drill G—Mask inspection by the numbers.—Being prepared for mask inspection, "by the numbers": 1. *Inspection,* 2. *MASK.* Free right hand by holding canister in left armpit, the tube and face piece hanging over upper left arm. Examine exterior of satchel and sling, making sure that sling is properly fastened to satchel; that all metal hooks, clasps, buckles, and snap fasteners are present and are fastened securely in place; that satchel has no holes or tears; and that stitching is not ripped. Examine interior of satchel. See that the canvas loop for the canister and the loop for the antidim stick can are not torn or ripped loose, and that the can containing the antidim stick is present. *THREE.* Slip left arm through sling and allow the satchel to hang from the upper left arm, at the same time removing the mask therefrom by grasping the canister with the right hand. Examine the canister for rust spots and weak places by pressing lightly with the fingers, beginning at the bottom and working toward the top. Look under rain shield and see that the check valves are present. See that the rain shield is not loose. See that canister contents do not rattle on shaking. *FOUR.* Adjust mask to face, making sure of a proper fit; then pinch together the walls of the corrugated tubing just above the canister nozzle and try to inspire air. If air cannot be inspired, the mask is free from leaks. If a leak is

detected, its approximate location may be determined as follows: Pinch the walls of the corrugated tube together at the angle tube. If leak is no longer detected on inspiration, the leak is in the corrugated tube; otherwise it is elsewhere. If the leak is found not to be in the corrugated tube, then pinch together the flutter valves at the angle tube and also the corrugated tube. If leak is no longer detected on inspiration, then the leak is in the flutter valves; otherwise it must be in the face piece by process of elimination.

Having approximately determined the location of the leak, or having determined the absence of leaks, proceed with the minute inspection according to the remainder of the drill. Examine corrugated tube for obvious tears, punctures, or other defects. See that it is properly connected to the canister nozzle and to the angle tube, noting in this connection that the adhesive tape over the binding wires is present and in good condition. *FIVE.* Examine flutter valves for tears and pinholes, by distending the rubber between fingers. Look especially for pinholes just below where flutter valve is joined to angle tube and for tears around valve opening. See that valve has no dirt or sand in it and that it is properly connected to the angle tube. See that binding wire is properly taped. See that flutter-valve guard is not loose. *SIX.* Examine outside of face piece for tears or other damage to stockinet. See that angle tube is properly connected to face piece with rubber band surrounding the binding. See that the fabric has not torn or pulled loose around the eyepiece frames. Examine the chin seam and see that it is in good condition and properly taped inside and outside. Examine the inside of the face piece for pinholes by creasing the rubber inner surface backward, thus causing the pinholes to appear, due to their enlargement from stretching. See that the deflector is in good condition, properly connected to the angle tube. Test the entire face-piece fabric for softness and pliability. *SEVEN.* Examine head harness. Make sure it is complete; that the straps are firmly attached to the face piece, to the harness pad, and to each other, as the case may be. See that the adjustment buckles are in good condition and that the straps have not lost their elasticity. *EIGHT.* All men with defective masks step forward one pace. Others replace mask in the satchel, taking care to replace canister and face piece in proper position.

Notes.—After mask inspection the men should be given mask-adjustment drill once, so that it may be readily seen whether all masks have been correctly replaced in satchel.

Failure to detect a leak does not mean that a mask is free from defects. This procedure indicates actual leaks only, and does not indicate impending leaks or other defects caused by rotting tape and rubber, rusting wire, pinholes which

only partially penetrate the fabric, etc. It is therefore necessary to complete the drill whether leaks are detected or not.

Use of the gas chamber.—Having drilled men in the use, inspection, and care of the gas mask, the next steps in the training are the final test of the fit of the mask to the face of the wearer, demonstration of the efficiency of the mask, and practice in mask drill in an atmosphere of toxic gas. The gas chamber is used for these purposes. The following is the proper order of procedure in gas-chamber work, but it should be noted here that the entire work need not necessarily be given at one time. The purpose of each test should be explained to the men before it is carried out.

Upon assembly at the gas chamber the men will be given a few minutes' mask drill. This is immediately followed by mask-inspection drill. The great necessity for a thorough inspection of the mask before entering a toxic atmosphere should be carefully impressed upon the men.

Having completed mask-inspection drill, the men will adjust the mask to the face and then will enter the gas chamber, in which a suitable concentration of lachrymator has been introduced. They should remain in the chamber for 5 minutes. On emerging from the chamber, they should be led a sufficient distance away from the gas chamber to make sure on removal of the mask that their eyes will not be affected by fumes leaking from the chamber. They are then ordered to remove the mask, and their eyes are inspected for lachrymation. This inspection should take place as soon as possible after removal of mask and, if a large number of men have been exposed, they should be divided into groups of appropriate size and the order to remove the mask given to one group at a time. Before inspection for lachrymation, notice should also be taken as to whether or not the mask fits too tightly. If the mask is not too tight and no lachrymation is detected, a correct fit may be assumed.

The next test is to have the men re-enter the lachrymator chamber without wearing the mask and remain there until they experience lachrymation. This test serves as a comparison between no protection and that afforded by the mask. At the conclusion of this test the men are given a few minutes to recover from the effects of the lachrymator. They should be instructed to turn their faces into the wind.

During this recess the chamber is prepared for the next test. If the chamber has two rooms, the room containing the lachrymator is kept closed and the chlorine liberated in the other room, as previously described. If there is only one room, it should be well ventilated and an

effort made to completely remove the lachrymator vapor before liberating the chlorine.

The purpose of the next test is to get the men accustomed to the presence of toxic gas. They will adjust the mask to the face and enter the chamber. Then, one by one, as designated by the instructor, the men will stop breathing, remove their mask within the chamber, and come out.

The final test is the most important of all, and the foregoing tests are all preparatory to it. This test consists of adjusting the mask to the face while in a toxic atmosphere. Before entering the chamber the instructor will caution the men regarding the importance of clearing the face piece from gas, according to *FIVE* of mask drill B. Then with the mask entirely placed in the satchel the men will stop breathing, enter the chamber and adjust the mask to the face. They should be instructed that if some gas still remains within the face piece after adjustment to repeat *FIVE* of mask drill B several times until the odor of gas can no longer be detected. Having adjusted the mask to the face within the chamber and cleared the face piece of gas, they will remain in the chamber for a minute or two and come out. Gas chambers have been constructed at the majority of the navy yards and at the larger naval stations with the view of familiarizing naval personnel with the several types of gas masks, the proper method of adjusting and wearing them, and their protective properties and limitations. Personnel should avail themselves of these facilities in accordance with existing instructions when the respective ships to which they are assigned visit such yards or stations.

Wearing of the mask results in a reduction in efficiency of the individual. The loss in efficiency can be minimized, however, by practice in wearing the mask during general work. This practice should be made easy at first and should become progressively more difficult by varying the nature of the work performed somewhat as follows: Close-order drill, extended-order drill, physical drill, fatigue duty, rifle practice, field maneuvers, and night marches. The night march is one of the most difficult things to do while wearing the mask, but its accomplishment is most important; in fact, it is one of the ultimate goals aimed at in training in individual protection, for in conditions of actual warfare a soldier will often have to undertake a night march, with a full pack or as a member of a carrying detail, while wearing the mask.

Note.—This practice of accustoming personnel to the gas mask, in use for some time in the Army, will have increasing application to naval personnel in their drills, general work, etc., as the science of gas warfare is developed for use at sea.

UPKEEP OF GAS MASKS

Inspection of masks.—The following instructions, which apply to drill masks, will be applicable to war masks only in time of war, when these masks are taken out of their containers and distributed to various battle stations.

Each gas petty officer should be equipped with a spanner wrench for loosening the canister nozzle nut, allowing its rain shield to be turned at right angles to its normal position. In this position the two check valves may be inspected and new ones inserted if necessary. Inspection should be made occasionally to see that the nut referred to above is screwed down tightly. Upon shaking, no rattling noises should be heard in the canister, all internal parts seeming tight and well packed. A severe blow might cause the nozzle to break in the threads; consequently an occasional visual inspection of the nozzle is recommended. If the adhesive tape around any of the wire bindings becomes loose, no harm is done, and it will be as good as new by applying new tape. For care of masks in use, the gas noncommissioned officer or petty officer should herefore have, in addition to the spanner wrench mentioned above, a supply of extra valves, and a roll of ¾-inch adhesive tape. Defects causing use of more than the above should be sufficient reason to issue a new canister.

The following brief discussion of the effect of moisture, age, and cold weather on the mask will show the wearer what to look for and will thus enable him to inspect his mask efficiently and thoroughly.

After a considerable period in a very moist atmosphere, sufficient moisture will be brought into contact with felt and absorbed by it to cause an appreciable increase in resistance to breathing. It would require many hours for this resistance to be increased to such an extent as to cause distress. Prolonged moisture tests show little or no harmful effects upon the chemicals. Little trouble may be expected from moisture if proper precautions are taken, and any effects will first be noticed in an increasing resistance to breathing. This should not cause worry if the wearer is in a gassed atmosphere, for it can safely be said that the protection will be, if anything, higher under the new condition.

Excessive or prolonged moisture tends to cause decomposition or rotting of the stockinet fabric of the face piece, thereby causing it to give way under strain such as it might be subjected to in service. The rubber itself also deteriorates and cracks, thus rendering it permeable to gas; also, to some extent, it takes a permanent set more rapidly. This particu-

larly applies to the harness, where the rubber threads more quickly lose their elasticity and the cotton threads also weaken. In regard to the harness pad, the effect of moisture is first noticeable in the weakening of the tabs to which the buckles are attached. Other effects of prolonged dampness are the practical decomposition of the protection tape around the wire bindings of the deflector, flutter valve, angle tube, and hose, thus exposing them to rust and consequently decomposition. Leakage of the flutter valve and eyepieces, due to decomposition of the rubber of the former and the eye washer of the latter, is also possible. In addition, prolonged dampness fogs the lenses by causing a separation of the 3-ply construction. Mildew is a general factor resulting from prolonged dampness.

Inasmuch as the material of the corrugated tube is similar to that of the face-piece fabric, the injury thereto would be similar to that of the latter, resulting in a tendency toward leakage, permanent set in a distorted position, and weakening under strain. It is extremely unlikely that those defects will occur under average conditions unless the mask is badly treated or neglected.

The effect of age on the canister is decidedly different for different conditions. In storage packed in moisture-proof boxes, with corks in the nozzle of each canister, no serious deterioration should occur over a very long period; at least we can safely say not in 3 years, for we have evidence of such a period. If subjected to gas under field conditions, life of the canister will vary with the concentration of gas and the time of exposure. Under conditions similar to the average experience during the World War, the life of the canisters can be depended upon to last at least 3 months. When used for training, the life of the canister depends largely upon the care taken to preserve it from damage and moisture. Experience has indicated the life of the canister under these conditions, when subjected to gasses used in training, is not appreciably shorter than those maintained in store.

Age affects the face piece in a similar manner to moisture, except that the rubber parts are affected more readily than are the fabric parts. The face-piece material takes a permanent set which, when stored in a carrier, tends toward a crease in the forehead portion, which is liable to render a gas-tight fit difficult. Also the small cracks which appear are likely to cause leakage. The harness loses its elasticity and is rendered useless thereby. Loss of flexibility of the flutter valve will cause dangerous leakage. The rubber cement under the strapping also deteriorates, causing it to loosen, with resultant leakage of the chin seam.

The corrugated tube is affected by age in the same manner as the facepiece material. The most marked result is the permanent set it takes in a bent position. This tends to shut off the air and thereby increases the resistance to breathing when in use. Loss of flexibility also results.

When the mask is in use, cold weather results in fogging of the eyelenses, due to condensation of moisture in the inhaled air on inner surfaces. Also, saliva and moisture in exhaled air may freeze on the flutter valve, especially if the mask has not been dried after use and glycerin placed in the flutter valve. Varying temperatures should have little or no effect, as allowance is made for variations from the normal temperatures. Subjection to extreme cold for a long period would impair the life of the check valves. These can be inspected at all times and, even though not functioning perfectly, no serious effects may be noted during the life of the canister.

Care of masks.—The gas mask has been specially designed and constructed to withstand the wear and tear of use in the field and, if properly cared for, will last a long time. The chief enemies of a gas mask *are prolonged moisture, extreme age,* and *rough handling and treatment.* It takes very prolonged moisture to damage a mask. It can be worn for extended periods in the rain and will show no bad effects if dried out afterward. Decomposition due to extreme age will always manifest itself on inspection before the efficiency of the mask is lost. Rough handling in use or storage may cause serious mechanical damage, such as breaking eyelenses, dents in the metal parts, or tears in the fabric. This is especially apt to occur if other articles are carried in the satchel or if the entire mask is thrown around carelessly.

Properly to care for the mask, the following precautions must be observed:

(1) Keep mask from all unnecessary moisture and dry it out if wet.

(2) Carry nothing else in the satchel except the antidim stick.

(3) Keep mask where it will not be damaged by a blow or heavy weight when not in use.

(4) Inspect mask thoroughly at regular frequent intervals.

(5) When masks are not in use, the face forms should be carefully inserted to prevent the face piece taking on a permanent set. When the mask is replaced in the satchel, see that the corrugated tube is not distorted, and that the face form is properly inserted.

A single small defect may render the entire mask unfit for use. Furthermore, it may be difficult for a defect to be repaired. New check valves can be inserted in the canisters. Wire bindings and tape can be

replaced and an entire new canister can be substituted. Various parts can be replaced from the repair kit. Glycerin is used in the flutter valve parts to prevent them from freezing. Also its non-evaporative and slightly adhesive qualities render it useful in keeping the walls of the parts closed except during exhalation.

Disinfection of masks.—Whenever masks are exchanged or used by more than one man for training purposes or otherwise, they should be disinfected immediately after use. This disinfection should be carried out under the supervision of an officer of the medical department. If medical supervision is not available, the disinfection may be carried out by the officer in charge of the training, as follows: Have ready a 2 per cent compound creosol solution and several small rags.

(1) Hold the mask in the hand; saturate one of the pieces of rag with disinfectant and sponge the entire inner surface of the face piece, including the outer and inner side of the deflector; then apply disinfectant similarly to the outside of the flutter valve.

(2) Pour a few cubic centimeters of the disinfectant into the exit passage of the angle tube; press the sides of the flutter valve with the thumb and finger so as to let the disinfectant run out, and do not shake off the excess.

(3) Allow all disinfected parts to remain moist for about 15 minutes and wipe out inside of face piece with dry rag. The mask should be allowed to dry thoroughly in the air before it is returned to the satchel.

GASES ENCOUNTERED IN PEACE-TIME OPERATIONS

Even in peace time, casualties to personnel may occur aboard ship through lack of oxygen or from the presence of certain injurious gases. The following information dealing with the nature and effects of gases encountered during peace-time operation and with the apparatus used to protect personnel against such gases is taken from Chapter 28, *Bureau of Construction and Repair Manual*.

Normal air (the atmosphere we breathe) is a simple mixture (not a chemical combination) of the following gases:

Nitrogen (approximately), 78 per cent by volume;
Oxygen, 21 per cent;
Hydrogen and certain inert gases and traces of carbon dioxide (approximately), 1 per cent.

Nitrogen is a noninflammable, colorless, gaseous, non-metallic element, tasteless and odorless. In its free state its is incapable of supporting life.

Hydrogen in its pure state is a colorless, tasteless, odorless gas. It is the lightest known substance, being $\frac{2}{29}$ the weight of air and about $\frac{1}{11,000}$ the weight of water. It is very inflammable. Nitrogen and hydrogen as occurring in the atmosphere have no effect on the human body.

Oxygen is a colorless, tasteless, odorless gas occurring in the free state in the atmosphere, of which it forms about 21 per cent by volume. *This gas is necessary to support life.* Insufficient oxygen may be caused by fire or slow chemical absorption in unventilated spaces. Approximately $\frac{1}{5}$ of the oxygen in each breathful of air is absorbed by the body. More oxygen is necessary when a person is active than when at rest. A person exercising violently may require 10 times as much oxygen as when completely at rest. The increased quantity is provided by deeper and more frequent breathing. The tissues of the body absorb a higher percentage of the oxygen which is circulating in the blood when a person is exercising.

The greater demand for oxygen while muscular work is being performed is well illustrated by the fact that a person whose blood is partially saturated with carbon monoxide may be getting enough oxygen while at rest and may not realize that anything is wrong, whereas if he makes any considerable exertion while in this state the fraction of the hemoglobin (the oxygen-carrying agent of the blood) which has not combined with carbon monoxide may be insufficient to transport all of the oxygen needed, and he is liable to collapse. More oxygen is required when the large muscles of the body, those of the legs, for example, are doing work than is required when smaller muscles only are in active use. A person at rest (at sea level) is unable to absorb a sufficient amount of oxygen when the proportion of oxygen in the atmosphere falls below 13 per cent, and unconsciousness occurs at 9 or 10 per cent. Unconsciousness occurs at higher percentages when a person is active.

An analogy between the consumption of oxygen by the body and that consumed by a fire cannot be drawn strictly, as life depends upon the percentage of oxygen in relation to other gases present. A candle ceases to burn when oxygen in the surrounding atmosphere falls to 16 or 17 per cent, regardless of atmospheric pressure, whereas a person can accommodate himself to even lower percentages by breathing deeper and faster. Of course, the human being could not survive with as low a percentage of oxygen on a mountain as at sea level, because under the reduced pressure, even with the normal 20 per cent of oxygen, there is actually less oxygen in every cubic foot of air. For example, it is

stated that on Pikes Peak the partial pressure of oxygen present corresponds to about 13 per cent at ordinary pressure. If a lighted candle continues to burn in an unventilated compartment, it may be assumed that there is a sufficiently high percentage of oxygen to support life. The point at which the flame is extinguished is but slightly above the danger point for human beings at sea level.

A gradual decrease in the amount of oxygen to the danger point may not give any warning. As a lack of sufficient oxygen deadens the faculties, a person not infrequently becomes unconscious without realizing that anything is wrong. Contrary to the usual belief, an increase in the percentage of oxygen, even up to pure oxygen, causes no more oxygen to be absorbed for the performance of a given amount of work and causes no appreciable harm. Death due to drowning or carbon-monoxide poison is entirely due to the fact that the brain cells have been deprived of oxygen for a sufficient time to prevent recovery.

Carbon dioxide, sometimes called carbonic-acid gas, is a chemical combination of 1 part of carbon and 2 parts of oxygen. It is a colorless, odorless, transparent gas, with a slightly acid taste. It does not support combustion. It is usually liberated in nature by combustion (including slow decomposition of vegetable and animal matter) and by the breathing of animals. The oxygen taken into the lungs combines in the body with carbon, which is derived from food, and this chemical combination generates the heat which maintains body temperature. Carbon dioxide is given off through the lungs and passes out with the breath. Carbon dioxide in nature is in turn decomposed by the green coloring matter of the leaves of growing plants (chlorophyll), the carbon being absorbed in the growth of the plant, much of the oxygen being released.

When air is rebreathed, for example, in a smoke helmet or in the breathing bag of an oxygen rescue breathing apparatus, if the chemical absorbent is not working effectively, the carbon dioxide present gradually increases, causing a headache or other symptoms. When the proportion of carbon dioxide rises to approximately 5 per cent, a person experiences distinct panting. With 8 per cent, the difficulty in breathing becomes very distressing. The increase in the depth and rapidity of breathing experienced when exercising is caused by the increased amount of carbon dioxide accumulating in the blood and acting on the respiratory center in the brain. It is by this means that the body secures the increased amount of oxygen needed and eliminates the excess of carbon dioxide.

The need for oxygen does not directly affect the breathing. It is the presence of too much carbon dioxide in the blood that causes the deeper

breathing, and finally panting, as the percentage of carbon dioxide increases. A person thus has some warning when the proportion of carbon dioxide is gradually increasing, although dependence for safety should not be placed upon this. On the other hand, he has little or no warning when the amount of oxygen is dangerously decreased. The effect of an excessive amount of carbon dioxide is immediately overcome by fresh air, as this gas in itself is not poisonous. Carbon dioxide is heavier than air, and accumulation in unventilated spaces is a common occurrence. In view of this, the oxygen rescue breathing apparatus described herein should be worn when work requiring the entrance into holds, tanks, or similar confined spaces on board ship is to be performed.

Carbon monoxide is a colorless, odorless gas. It is a chemical combination of equal parts of carbon and oxygen. It is formed by smoldering fires or slow rates of oxidation when the amount of oxygen present at the point of combustion is not sufficient to provide two parts of oxygen for each part of carbon burned. Funnel gases, coal gas, gasoline-engine exhaust gases, illuminating gas, and the gaseous products of modern explosives are all rich in carbon monoxide. Many deaths have resulted from the use of portable charcoal stoves in poorly ventilated rooms. The majority of cases of gas poisoning (asphyxiation) is due to carbon monoxide, and unless it is known definitely that some other poisonous gas, such as chlorine or one of the more potent warfare gases, is responsible, it should be assumed that carbon monoxide is the cause of asphyxiation.

Carbon monoxide is rightly classed as a dangerous poison, but in the strictest sense of the word it is not a poison at all because, although it combines with the red coloring matter of the blood and prevents the blood from absorbing a sufficient amount of oxygen, it really does not harm the blood in the least, and after the carbon monoxide has been eliminated the red coloring matter (hemoglobin) is in just as good condition to carry oxygen as before. Hemoglobin absorbs carbon monoxide in the same way as it absorbs oxygen, but the affinity of hemoglobin for carbon monoxide is between 200 and 300 times as strong as its affinity for oxygen. The hemoglobin, therefore, takes up equal quantities of carbon monoxide and oxygen when approximately 0.1 per cent of carbon monoxide is present in the air.

Death or serious after effects from carbon-monoxide poisoning are due to *degeneration of the delicate nerve cells in the brain caused by oxygen starvation* and not to any direct effect on the body caused by carbon-monoxide gas. In air containing 2 to 5 per cent of carbon mon-

oxide death follows almost as quickly as in drowning. Roughly, it may be stated that a man who has breathed air containing 0.2 per cent of carbon monoxide 4 or 5 hours, or 0.4 per cent for 1 hour will die. The breathing of air containing lower percentages of carbon monoxide causes effects proportionate to the amount present and length of time breathed. Carbon monoxide is one of the most potent poisonous gases and is the most common dangerous gas encountered on board ship. *Its special element of danger is its failure to give any warning symptoms before asphyxiation takes place.*

Chlorine and phosgene.—Other poisonous gases, with the exception of chlorine and phosgene, are not likely to be encountered on board ship during peace-time operation. Chlorine may be generated as the result of the action of salt water on the contents of electric storage batteries of submarines. Several instances are known where chlorine and slight traces of phosgene have been generated by the reaction of carbon tetrachloride in fire extinguishers when played on burning matter. While the amount of either gas formed under these circumstances is small and in open air rarely causes ill effects, they have, in the Navy, proved of sufficient volume and concentration to cause fatalities when encountered in confined spaces without proper means of protection.

ASPHYXIA

In simple asphyxia, artificial respiration by which the lungs are at once adequately supplied with ordinary air is sufficient treatment. In carbon-monoxide asphyxia the strong affinity between the hemoglobin and the monoxide must be overcome before the blood can transport sufficient oxygen to meet the vital need of the tissues. To hasten the separation of carbon monoxide from the hemoglobin, *pure oxygen* should be administered, if obtainable. If the victim is still breathing, oxygen should be administered from a tank through a bag and a mask.

In carbon-monoxide asphyxia, as in simple asphyxia, drowning, electric shock, or other form of simple asphyxia, the matter of primary importance is the lack of oxygen in the tissues. Some of the most essential brain cells suffer irreparable damage if deprived of oxygen for about 10 minutes. The heart continues to beat for several minutes after breathing stops; but with the muscles of respiration temporarily paralyzed, oxygen does not reach the blood and the heart soon stops beating effectively, the victim dying of asphyxia. The prime necessity is renewal of the supply of oxygen to the blood before the heart stops beating effectively.

ARTIFICIAL RESPIRATION

First aid.—If the victim is not breathing, artificial respiration by the prone-pressure method must be given *without interruption.* With intelligent assistance it is possible to introduce sufficient oxygen by the method noted above in conjunction with the prone-pressure method materially to enrich with oxygen the air entering the lungs. The assistant should hold the mask to the victim's face during the inspiratory (release) movement and lift the mask a little during the expiratory (pressure) movement. If oxygen will serve its purpose, it will do so in 15 or 20 minutes, and it is useless to continue the administration for more than half an hour.

Cause of death.—In carbon-monoxide poisoning which proves fatal, although the victim may be still breathing when carried into the fresh air, death results because of insufficient supply of oxygen to the tissues during the time he was breathing the poisonous atmosphere. If serious degenerative changes have started, no amount of oxygen nor any other treatment can restore the damaged nerve cells. On the other hand, if the cells have not been seriously damaged, complete recovery may follow without any treatment other than removal to fresh air.

Critical period.—There is thus, as in simple asphyxia, a critical period beyond which recovery is out of the question. For an hour or more after relief measures are started, it may be impossible for anyone to state whether the degree of poisoning has passed the danger point. It is therefore of the utmost importance to supply the cells with oxygen as soon as possible on the chance that the critical period has not been reached. Resuscitation efforts must be continued without interruption for several hours, if necessary, or until a medical officer declares further efforts futile.

The subject may be profoundly unconscious and actually at the point of death from exposure to a concentrated mixture of carbon monoxide, yet, if the duration of deficient brain oxygenation has not been too great, half an hour in the fresh air, with artificial respiration if necessary, will be enough to effect a seemingly remarkable recovery. On the other hand, long exposure to lower percentages may be fatal even though the subject is breathing when brought into fresh air. For example, when 60 or 70 per cent of the hemoglobin has combined with carbon monoxide, so that only 30 to 40 per cent remains available to transport oxygen, degenerative changes will start if the subject remains in that state for half an hour or longer, and death, or at least serious nervous and mental impairment, will follow in spite of treatment.

Elimination of carbon monoxide.—When the subject who is still

breathing is brought into fresh air, or when artificial respiration is begun while the heart is still beating effectively, the combination between carbon monoxide and hemoglobin begins to break up immediately, although the separation is more rapid if pure oxygen is breathed. Even with ordinary air (20 per cent oxygen) the hemoglobin may be freed sufficiently in 10 or 15 minutes to transport the necessary amount of oxygen to the brain and other tissues. As a rule, practically all carbon monoxide is eliminated within 6 or 8 hours, and the hemoglobin is then just as efficient as if the subject had never been poisoned. Clearly, the advantages of administering pure oxygen or air enriched with oxygen diminishes after the first few minutes, and ordinary fresh air will serve all purposes after the first half hour.

Recovery dependent on length and degree of exposure.—As a matter of fact, in a considerable percentage of the cases the subject does not recover in spite of rapid elimination of carbon monoxide. In cases where the symptoms are prolonged, impairment of vision and disturbances of mentality are not infrequent. Everything depends on the length of time the tissue cells have been deprived of a sufficient supply of oxygen. Prompt recovery may follow after profound poisoning of brief duration; recovery is slow after long exposure to comparatively weak mixtures. Men constantly breathing air containing percentages of carbon monoxide too small to interfere with the oxygen-carrying power of the blood do not show symptoms of cumulative effects.

Treatment.—*Keep the victim warm.*—The victim of carbon-monoxide poisoning should be kept warm.

First-aid treatment.—The following method of resuscitation from asphyxiation by poisonous gases has been approved by the Bureau of Medicine and Surgery:

(1) Promptly remove the victim from the poisonous atmosphere. If he is wearing any form of breathing apparatus, remove it. Keep him in a recumbent position. If he is conscious, *do not allow him to exert himself.* Notify the medical officer.

(2) If breathing is slow and irregular or if it has stopped, as may be the case in sudden exposure to concentrated carbon monoxide, begin artificial respiration, as in cases of drowning, immediately at the nearest place where fresh air can be obtained. *To wait for a medical officer or any kind of mechanical resuscitation apparatus may mean the loss of a life which could have been saved by beginning artificial respiration at once and continuing without interruption.* Even to delay while apparatus is being adjusted may be dangerous.

(3) The method of artincial respiration with the use of oxygen in

suitable cases will save life where life can be saved. Where it fails, although properly performed, it may be assumed that mechanical resuscitation apparatus would have failed.

PROTECTIVE APPARATUS

Types of apparatus furnished.—Protection against noxious and poisonous gases or smokes, oxygen deficiency, etc., is afforded by the following apparatus issued by the Bureau of Construction and Repair and illustrated in its *Manual:*

Oxygen rescue breathing apparatus (Navy type).

Emergency fire hood.

Gas masks (submarine and ammonia).

The oxygen-breathing apparatus provides complete protection against noxious atmospheres because of the wearer breathing an artificial atmosphere, the necessary oxygen being furnished from a flask which is a part of the apparatus and the carbon dioxide being absorbed by a chemical through which the exhaled air is passed before it is rebreathed. It should be worn when entering compartments where the atmosphere is suspected of being irrespirable, for fighting fires, or under any other circumstances where the conditions involve a possible development of oxygen deficiency. The operation of this apparatus and the capacity of the flask when fully charged are such as to enable the wearer to remain in an irrespirable atmosphere for about one-half hour while engaged in moderately hard work.

In order that this apparatus may be of real service in an emergency, it is of the greatest importance that a *considerable number of men be trained in its use.* The training of only a few men is not sufficient, as it is always possible that the few trained men may not be on board when an emergency arises. It is of great importance that the men who have been trained in its use should also be thoroughly familiar with the *arrangement of the ship* and the access to all compartments.

It is very important that the rescue breathing apparatus be kept in first-class working condition and that the goggles, nose clips, etc., are kept in the box with the outfit. The oxygen cylinders must be frequently inspected to insure that the contents have not leaked out. Empty cylinders should be immediately replaced by charged cylinders. A stock of charged cylinders is kept at all navy yards.

Emergency fire hoods afford protection against noxious atmospheres for a time not to exceed *3 to 5 minutes,* depending upon the activity of the wearer, after which time the wearer will collapse. The hood is

simply a large loose bag (fitted with goggles) which, fitting closely around the neck, entraps a certain amount of fresh air which is breathed over and over. When this air becomes bad the wearer must seek fresh air. Its advantages are that it may be slipped on quickly by any untrained man for quick action before the regular rescue crew can adjust their oxygen apparatus.

The emergency fire hood is particularly useful for closing a valve, shutting down a blower, etc., in a smoke-filled compartment. The wearer should always be provided with a *life-line,* because difficulties may arise in connection with his mission which may prolong his stay in the compartment, or, under excitement, he may not notice the passage of time and be suddenly overcome.

No special instructions appear to be necessary in regard to this apparatus, excepting that as much air as possible should be entrapped when putting the hood on, and it should not be kept on longer than from 3 to 5 minutes. The oxygen entrapped in the bag will not last as long when the wearer is exercising as it would were he at rest. Rapid breathing due to excitement will also exhaust the oxygen more rapidly than would be the case with a man with steady nerves.

GAS MASKS FOR SUBMARINES

Gas masks for submarine service are not intended for protection against toxic gases or smoke which might be released by an enemy, but are intended solely for protecting the personnel of the submarine against gases and smokes which may be generated within the submarine by action of its machinery; burning out insulation, such as rubber, shellac, etc.; the use of tetrachloride extinguisher on a fire; the improper combustion of oil; and from accidents to storage batteries. In such emergencies carbon monoxide, chlorine, hydrochloric-acid gas, oil vapors, carbon-tetrachloride vapors, and smoke may be liberated, and the mask used must protect against them. (Gas masks for protection against war gases are not furnished submarines.)

NS Mark I gas mask.—This mask, issued to submarines only, is of the mouth-canister type. Such construction eliminates the flexible breathing tube and satchel of the ND mask, thereby doing away with outside hamper that otherwise might get foul of machinery in the confined space of a submarine. The mask consists of a stockinet-covered rubber face piece containing two nonshatterable eyepieces, angle tube, deflector tube, elastic head straps, and flutter valve, with a metal canister, containing the gas absorbents, attached to the face piece.

The uses of the chemicals are as follows:

(1) *Hopcalite* is the chemical agent which neutralizes any carbon monoxide which enters. In this process there results an unavoidable heating up of the canister; failure to heat up in the presence of carbon monoxide indicates that the canister is no longer effective against carbon monoxide. As a guard against this a layer of

(*a*) *Caustic pumice.*—This is a dehydrating (moisture absorbing) agent, of sufficient quantity to absorb moisture from the air for 1½ hours. In addition to this function, the caustic pumice also serves as the absorbent for chlorine, hydrochloric-acid gas, and sulphur dioxide.

(*b*) *Charcoal.*—This layer absorbs gasoline vapors, oil vapors, and carbon-tetrachloride vapors.

Care of masks.—The life of the chemical absorbent of this mask is shortened chiefly by

(1) Subjection to gases against which it protects.

(2) Prolonged subjection to moisture.

The life of the absorbents of an NS Mark I mask in protecting against the aforementioned gases in concentrations which may be expected on board submarines is about 1½ hours. The absorption of moisture tends to shorten this life materially by destroying the chemical efficiency of the hopcalite and by solidifying both the hopcalite and the caustic pumice. For this reason the mask is furnished in an air-tight metal container that should not be opened unless the mask is to be used in an *actual emergency*. After use, for no matter how short a time, a request for canister replacement should be forwarded to the bureau.

Air-tightness test of metal containers.—At periodic intervals the containers are inspected for rust spots and for leaks. Leak testing is done by immersing the container in water, pressing it with the fingers, and then releasing the pressure. The formation of bubbles during the process is an indication of a leaky container, and the mask must be regarded as unfit for use.

NOTE.—To vessels having ammonia refrigerating apparatus are issued special ammonia-gas masks, a mouth-canister type containing chemicals which absorb ammonia. Such masks should be used for no other purpose than protection from ammonia fumes.

CHAPTER 59

USE OF BOATSWAIN'S CALL

History 773
Piping and passing the word 775

HISTORY

As far as English ships are concerned, the call can be traced back to the days of the Crusades, 1248 A.D. As far back as 1485 A.D., it was used by the English as an honored badge of rank, and was then worn by the Lord High Admiral of England. It was probably worn because it has always been used as a method of passing orders. When the Lord High Admiral, Sir Edward Howard, was killed in action off Brest in 1513, a "whistle of honor" was presented by the queen mother of France to the officer who commanded the French galleys on this occasion. From about that time it was no longer worn as a badge of rank, and it reverted to its original use and was employed only as a method of passing orders. About 1671 it was referred to as a "call," and by this name it has been known ever since. In our Navy it is often referred to as a "boatswain's pipe."

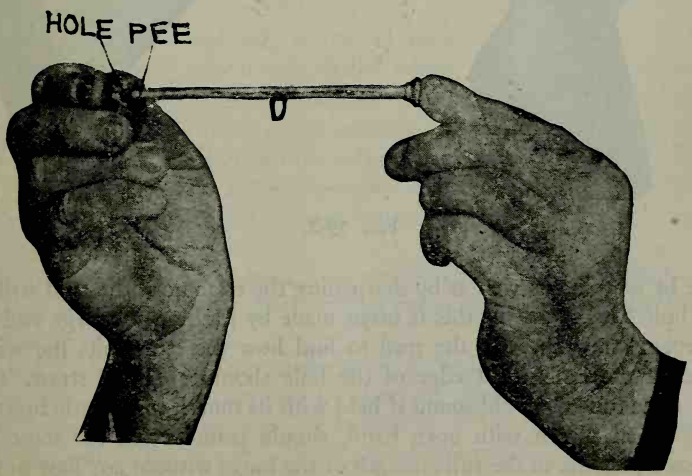


FIG. 59-1.

Tuning.—(1) Some calls issued are not shrill enough in sound, and each user of a call has his own method of tuning his call to that shrill note required in nearly all the pipes used.

(2) Most calls are too open at the pee and have to be flattened or soldered at the sides of the pee, so as to fill the space between it and the bowl.

(3) Some calls are improved by scraping the wind edge or edge of the bowl farthest from the pee. It is sometimes necessary to enlarge this

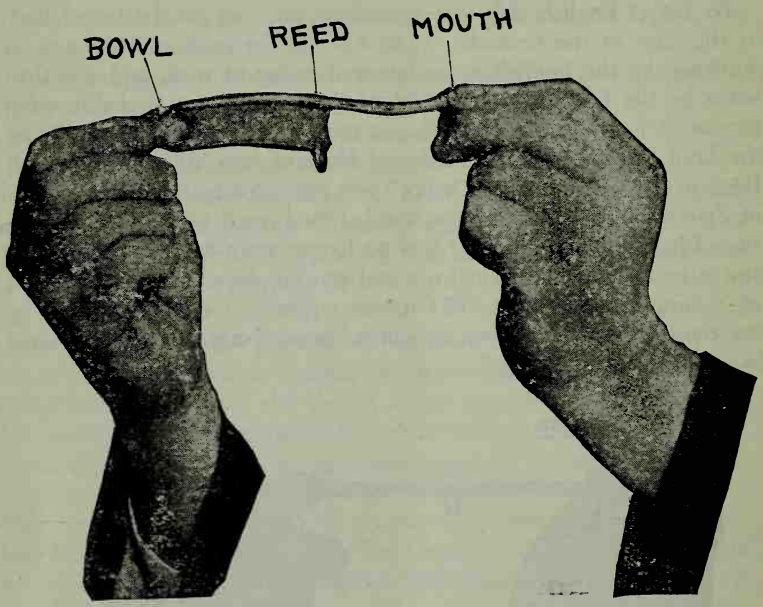


FIG. 59-2.

hole by scraping as well as by sharpening the edge until the reed strikes the hole fair. A test of this is often made by pushing the large end of a broom straw through the reed to find how the straw hits the wind edge of the hole. That edge of the hole should split the straw. The call, once tuned, should sound if held with its mouth to a gentle breeze; and, when blown with open hand, should sound from the most repressed pressure to the full strength of the lungs without any flaw in the

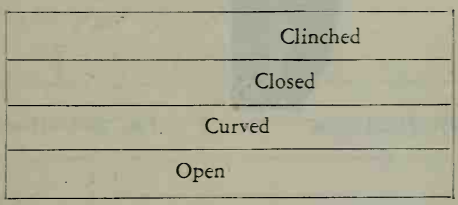
sound known as wind leak or hoarseness; and the sound with closed hand should be as clear and shrill as it is possible to make it.

Positions of the hand.—(1) There are four positions of the hand—*open, curved, closed,* and *clinched.*

(2) These positions also indicate the lung force or pressure of blowing. As a rule, the open hand calls for the least pressure required to make a soft, clear note, while the clinched calls for all the pressure that can be used in making the note shrill and clear.

PIPING AND PASSING THE WORD

The score; explanation.—(1) The four positions of the hand, *open, curved, closed,* and *clinched,* are indicated on the four spaces of a musical staff, thus:



(*a*) A *straight* line indicates a *smooth* note.

(*b*) A *dotted* line indicates a *rattled* note.

(*c*) A *broken* line indicates an *undulating* note.

(*d*) *Full arrowheads* along a line indicate *full* breath *impulses.*

(*e*) *Half arrowheads* along a line indicate *gentle* breath *impulses.*

(*f*) Intervals, or rests, are marked thus | with the numeral of the seconds above if more than 1 second is necessary, otherwise notes are slurred smoothly.

(*g*) The number of seconds each pipe should be given under normal conditions is marked above the bar, but circumstances often call for the signal to be shortened.

(2) (*a*) Smooth notes are made as an ordinary whistle is blown, and are simply raised or lowered by the lung force used.

(*b*) Rattled notes are made by the ballarding of the tip of the tongue against the roof of the mouth, imitating a whistle rattled by a pea.

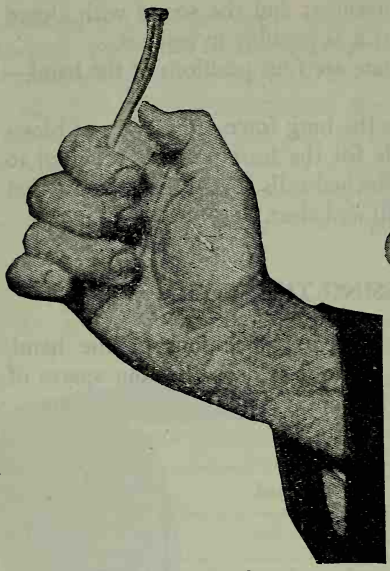


FIG. 59-3—Hand open.

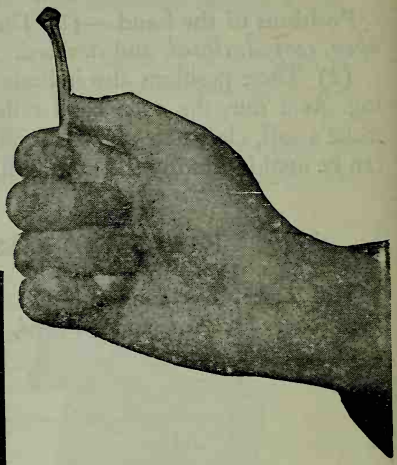


FIG. 59-4—Hand curved.

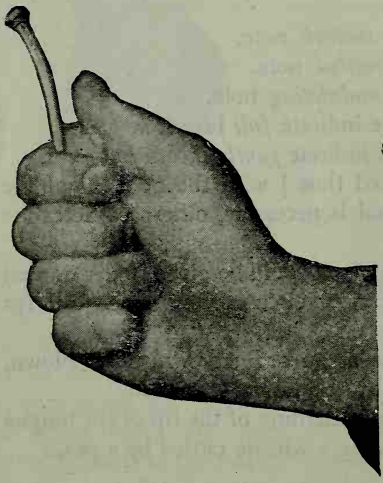


FIG. 59-5—Hand closed.

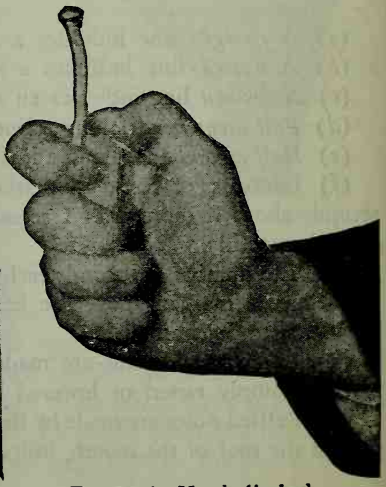


FIG. 59-6—Hand clinched.

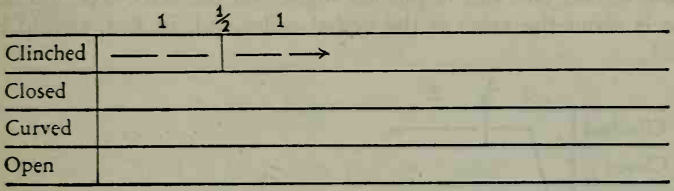
(*c*) Undulating notes are made by a combination of the tongue slightly undulating while the throat checks the lung pressure or flow of breath, causing the sound to undulate smoothly, but continuously, at equal intervals.

The use of the voice.—The tone of voice in passing the word should be modulated and pitched as the occasion calls for. The rising inflection should be given to such calls as *All hands, Up all hammocks,* etc., and the lowering inflection should be given to such calls as *Down all bags, All the watch,* etc.

Pipes and their uses.—(1) *Call mates.*—Piped by the ship's boatswain to assemble his mates.

(*a*) Call in clinched position and sound as "peep peep," "peep peep," short and shrill with a pause of less than 1 second after the first 2 peeps.

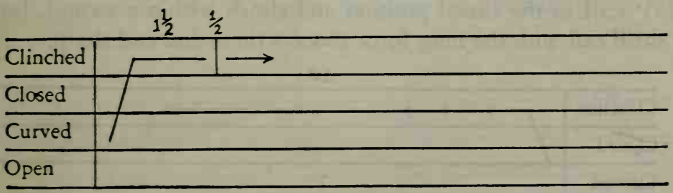
(*b*) This is answered by all the mates as they close on the point of assembling to receive the order to be passed from the boatswain or his chief mate, who blew the signal.



Call mates

(2) *Stand-by.*—Piped for *Set taut, Stand-by,* and *Lay in.*

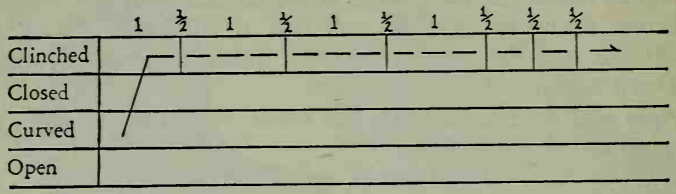
Commence with the call in the curved position and instantly change to the clinch, causing a rising peep, and follow it with a slurred peep, short and ending sharp.



Stand-by

(3) *Lay up.*—Piped to send men up or aloft together.

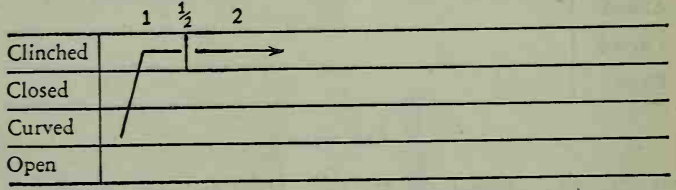
Commence as in *Stand-by* and follow the long peep by a series of 3 sharp peeps with an interval of about 1 second between each series of peeps, and slow down the last 3 peeps to about equal intervals between them.



Lay up

(4) *Lay-out.*—Piped to *Lay out* in manning yards or rail; also for *Trice up* and *Out booms.*

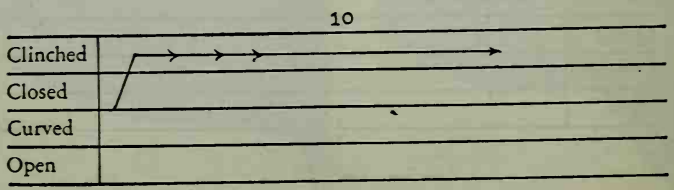
As in *Stand-by,* except that the first peep is but about half the length of the second one and is pitched higher on the start. The interval of time is about the same as the verbal order and, in fact, should be so timed.



Lay out

(5) *Word to be passed.*—Piped to command silence preliminary to passing an order or the word about information.

(*a*) Call in the closed position and clinch within a second. Impulse the shrill call with the lung force about 3 times and end sharp.



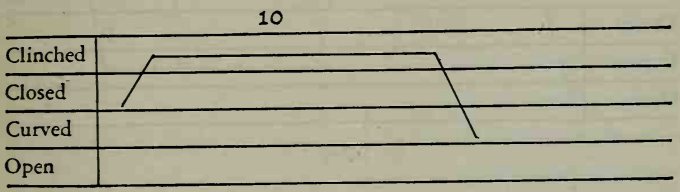
Word to be passed

(*b*) The length of this pipe should not be less than 5 nor more than 10 seconds. Sing out the words, *D'ye hear there,* than wait for all hands to silence, and pass the word as given by the officer of the deck.

(6) *Hoist away.*—Piped in hoisting boats, in hoisting generally, and in the walk away with the cat or fish falls; and is always preceded by the pipe *Set taut.*

(a) Same as (5), except that the shrill is not impulsed, and the shrill is softened by changing the position from clinched to curved, and the lung pressure is lessened so as to finish low and soft, instead of sharp.

(*b*) The length of this pipe is about 10 seconds for a signal to make a long walk away in hoisting.

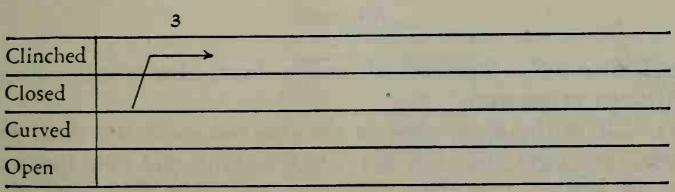


Hoist away

(7) *Haul.*—Piped to keep men pulling together.

(*a*) Call in the closed position and changed to the clinched, and so timed as to sound about an equal length of time in each position; finish with a sharp shrill. Normal time about 3 seconds.

(*b*) This signal is used at such times as the men are facing their work at a standstill and in position for a pull together. The low note of the signal is *Stand-by,* and the shrill note *Pull.* This is repeated as often as the signal is blown, and the length of the shrill note signifies the strength and amount of rope to be gained in the pull, so that as the signal is shortened it becomes the first note of the *Short belay.*

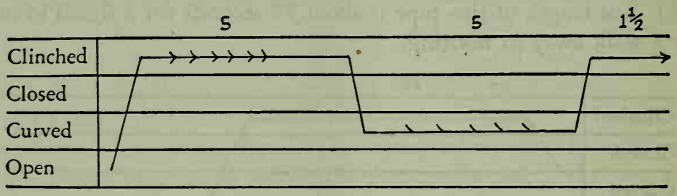


Haul

(8) *Belay.*—Piped to avast hauling and make fast; and also to annul an order just piped.

(*a*) Call open; close sharply to the clinch and impulse with the tongue to the roof of the mouth about 6 times while holding the first shrill of about 5 seconds; then change to the curved and impulse softly with the breath and tongue to cause a smooth, undulating sound for about the same interval as the impulsed shrill; then clinch sharply and finish with three shrill, slurred peeps in rapid succession.

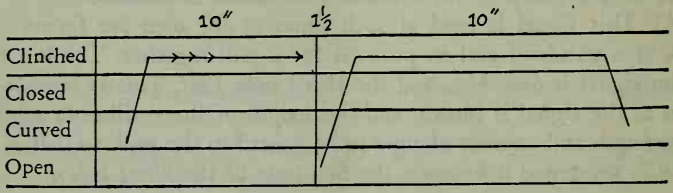
(*b*) This is the most difficult pipe to blow, owing to the contraction of it. The *Short belay* is more uniform in sound, as it really grows out of the *Short haul.* The *Short belay* means *Hold fast.*



Belay

(9) *All hands.*—Piped as a *general* for all events calling upon *all hands;* also for calling the first, mid, and morning watches.

Close to the clinched and impulse softly about 3 times, holding the shrill for 10 seconds, ending sharp, then again close to the clinched softly and hold the second shrill for 10 seconds and allow it to fall softly to a finish for 3 seconds.



All hands

(10) *Boat call.*—Piped to call away a boat; also to call a division or divisions to quarters.

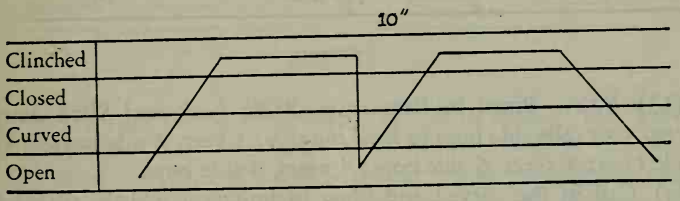
(*a*) Call in the open, close to the clinched, hold the shrill for 5 seconds, then open and close again to the clinch and hold the second shrill for another 5 seconds, then open and allow the signal to end softly, allowing about 3 seconds for the fall to silence.

(*b*) All hands should listen to this pipe, as the boatswain's mate is to sing out in a long-drawn *Away* the boat that is to be manned; and he should use the word *away* a second time in the call of the barge or the gig; such as *Away, barge (gig); away.* Etiquette requires that both the pipe and the word, when calling away the barge or the gig, should be full length. The pipe and the word for other boats are not to be so long.

(*c*) In calling a division or divisions to quarters, follow with *All the ——— division—to quarters.*

(*d*) The boatswain's mate looks for silence as in after the *Word-to-be-passed* pipe, and then pitches his voice in a roaring song, raising it to its full power on the first word of the call, and lowering it on the last syllable of the last word.

(e) The interval of the song is about equal to the interval of the call.

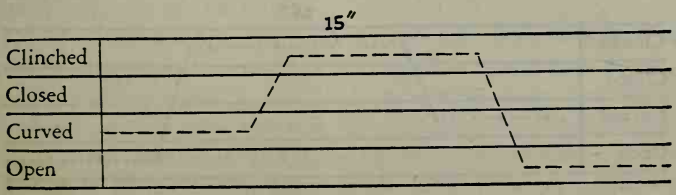


Boat call

(11) *Heave around.*—Piped for *Mess gear;* also to heave around a capstan.

(a) Call in the curved, and blow very softly with an undulating sound by checking the breath with the throat, allowing the tongue to undulate slowly; then in the clinched position, increasing the rapidity of the undulations from about the same interval as during the rising; then allow the sound to fall back to the soft, low tones of the start.

(*b*) Make a double *Heave around* for the capstan, and a single long *Heave around* for *Mess gear;* but the interval of the double *Heave around* should not exceed that of the single *Heave around.*

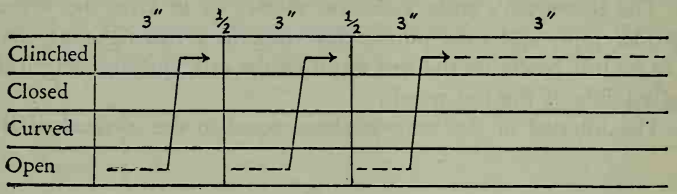


Heave around

(12) *Sweepers.*—Pipes all sweepers to start their brooms and clean out spit kits.

(a) Commence as in *Heave around* and close sharply to a short shrill. Repeat this 3 times and finish with 4 or 5 sharp peeps from the closed to the clinched in rapid succession. Repeat this from its commencement, but instead of finishing with the sharp peeps, make the sound more like an impulsed shrill as though slurring the peeps.

(b) If necessary the boatswain's mates follow with the words *Clear up the decks for quarters.*

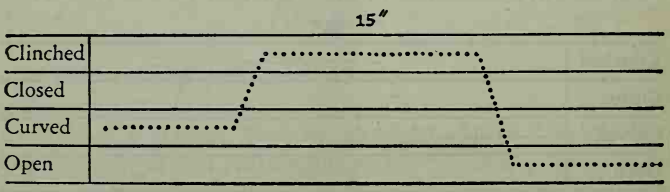


Sweepers

(13) *Veer.*—Piped to *Ease away, Walk back,* and *Slack away.* A slurred veer calls side boys to *tend the side;* 1 veer, 2 side boys; 2 veers, 4 side boys; 3 veers, 6 side boys; 4 veers, 8 side boys.

(*a*) Call in the curved and blow to imitate a whistle rattled by a pea. This rattling sound is produced by ballarding the tip of the tongue against the roof of the mouth; and the rapidity of the ballarding is in proportion to the pitch of the sound, rising to the maximum in the shrill rattle.

(*b*) For walking back the falls, this pipe is sounded continuously during the *Walk back* or the lowering from a *Belay;* and the speed of the lowering is in proportion to the undulations of the pipe or the rapidity of its rising and falling in sound caused by changing from curved or open to clinched, sometimes accentuated by impulsing with the throat; short peeps of it indicate to *lower handsomely* for a short distance as in the case of fouling while lowering.



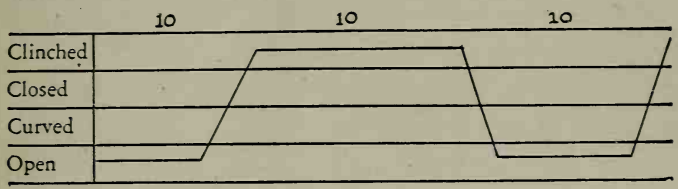
Veer

(*c*) At the finish of the lower or at the *Come up,* the signal is finished with a short, sharp peep as in the finish of *Pipe down.*

(14) *Piping the side.*—Accompanies appropriate side honors.

(*a*) Fill the lungs, commence with the lowest smooth note and rise to the shrill, then fall to the low note again and finish with a low, soft shrill.

(*b*) The time in rising to the shrill should be about equal to the time of holding the shrill, and the time of falling from the shrill should be about one-third less than that of rising, so that the time of rising, holding, and falling to a finish are about equal.



Piping the side

(*c*) The pipe *Alongside* is started in time to finish as the boat makes the gangway.

(*d*) The pipe *Over the side* is started in time to finish it when the visitor is greeted by the officer of the deck. At the first note of this pipe, the boatswain's mate takes station in rear of the proper outboard side boy and all side tenders come to the *Salute,* remaining at *Salute* during the sound of the pipe, and dropping to *Attention* at its last note.

(*e*) Upon the visitor's departure, the ceremony is reversed as follows: Boatswain's mate commences the first note of *Over the side* as the visitor passes him in departing; and the first note of *Away* as the visitor's boat gathers headway and curves away from the gangway in shoving off, and this signal should be very long-drawn in the finish.

(*f*) In the piping of officials alongside and over, the side pipe is lengthened to full breath for officials receiving 8 side boys. But short side pipes in any event are considered lubberly and contrary to the proper "etiquette of the side."

(*g*) For officials received with 8 or 6 side boys, the side will be piped by the ship's boatswain. For officials received with 4 side boys, the side will be piped by the chief boatswain's mate. For officials received with 2 side boys, the side will be piped by a boatswain's mate.

(15) *Pipe down.*—(*a*) This pipe is a combination of the pipe *Word to be passed* and a long *Veer* of about 10 seconds; ending in a

sharp, short peep, with an interval of 1 second between the two pipes.

(*b*) This signals the termination of all evolutions and ceremonies to which all hands had been called, and is blown by the boatswain's mate of the watch. After the sounding of taps, follow the *Pipe down* with *Silence fore and aft.*

(16) *Pipe to (any) meal.*—(*a*) Pipe *All hands,* long *Heave around* (*Mess gear*) and long *Pipe down.*

(*b*) This signals the termination of all evolutions and ceremonies 1 minute.

Sept. 12, 1942

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A.S. Salvatore T. Scancarello